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DATA PROCESSING AND ANALYSIS FOR ICECAP AND RELATED PROJECTS

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This report summarizes the data processing techniques and procedures used in the creation of data bases for ICECAP, EXCEDE and related projects. The data processing system and management procedures are detailed. Data bases created are summarized. Calibration information used in parameter determinations is also summarized.

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PREFACE

The authors wish to thank Mr. Leo F. Power, Jr., the Director of the Space Data Analysis Laboratory, for his administrative assistance throughout the duration of this contract.

In addition, thanks go to several members of the laboratory for programming and analysis efforts. Thus, we wish to thank Ms. Barbara Boudreau, Mr. Paul Connolly, Mr. Kenneth Dieter, Mr. Brian Donovan, Mr. Neil Grossbard, Mr. Owen Marr, Ms. Joyce L. Mendillo, Ms. Geraldine O'Brien, Ms. Carolyn Parsons, Mr. Brian Sullivan and Mr. Roger P. Vancour, Jr.

To the Contract Monitor, Mr. John C. Kotelly, thanks are extended for his support and assistance.

Thanks for their continual cooperation are extended to the remaining members of the Rocket Data Coordination Committee; Mr. Robert E. McInerney, Dr. A. T. Stair, Mr. James C. Ulwick, Mr. Philip Doyle and Mr. William F. Grieder.

For typing this document, we wish to thank Ms. Mary Kelly.

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1.0 INTRODUCTION AND BACKGROUND

The Space Data Analysis Laboratory of Boston College was contracted by the Analysis and Simulation Branch (SUA) of the Air Force Geophysics Laboratory (AFGL) to develop mathematical and computer techniques to be used in the reduction and analysis of data acquired from rocket borne probes. The necessary routines and techniques have been developed and implemented. Data bases have been created for various Air Force rocket programs.

The prime efforts during this contracting period were aimed toward data base development for the Infrared Chemistry Experiments - Coordinated Auroral Programs (ICECAP) and EXCEDE projects.

ICECAP programs were successfully carried out by AFGL scientists in 1972, 1973, 1974 and 1975. These programs were designed to investigate the ionization and excitation mechanisms and chemical processes causing both long and short wavelength infrared emissions in an auroral atmosphere. A number of rockets with payloads equipped to achieve the program goals were successfully launched.

EXCEDE programs were entitled EXCEDE II and EXCEDE SWIR. The EXCEDE program was designed to study the auroral infrared emission processes induced by a rocket borne electron accelerator. In these artificial auroral experiments, the conditions of electron energy, electron power, deposition volume, deposition altitude and dosing duration were parameters to be controlled and monitored.

In addition to the ICECAP and EXCEDE programs, data was successfully processed for vehicles associated with various other Air Force programs.

Data bases created for all requested probes have been archived. File formats and data base tape numbers are detailed in the appendix.

In order to perform the necessary tasks, a data processing system was developed whereby overall data flow and program interfaces were defined, routines were systematized and file formats were structured in a generalized form to allow for easy storage, retrieval and display of selected parameters. The data processing system is detailed in Chapter 3.

In order to facilitate the performance of the total effort, data management procedures were initiated whereby weekly meetings were held with the Contract Monitor to review the status of each problem and to exchange information. In addition, a Rocket Data Coordination Committee was formed which was comprised of the Contract Monitor, alternate Contract Monitor, problem initiators and their representatives and a representative from the Space Data Analysis Laboratory of Boston College. This committee met on a monthly basis. Committee purpose was that of facilitating the handling of large amounts of data. Data management procedures are detailed in Chapter 2.

Figure 1 summarizes the main vehicles, along with pertinent launch information, for which data was processed. Figure 2 is a summary of the processed subcarriers. Telemetry assignments for these subcarriers are included in the summary.

This document also provides a summary of the data bases and calibration information used in parameter determinations

VEHICLE

PROGRAM	VEHICLE	LAUNCH DATE	LAUNCH TIME	VEHICLE TYPE
ICECAP 73	A18.006-2	22 March 1973	1212:37	Black Brant
ICECAP 73	A10.205-2	24 March 1973	1031:42	Paiute Tomahawk
ICECAP 73	A18.205-1	27 March 1973	0937:45	Black Brant
ICECAP 74A	A18.006-4	14 February 1974	0607:00.53	Black Brant VC
ICECAP 74A	A18.219-1	25 February 1974	0738:30.3	Black Brant VC
ICECAP 74B	NJ74-1	11 April 1974	0800:59.985	Nike Javelin
ICECAP 74B	A10.312-3	18 April 1974	0840:15.201	Paiute Tomahawk
EXCEDE	EX531.43-1	15 April 1975	0946:00.030	Castor Recruit
Midlatitude	A30.311-8	2 Dec 1975	1256:47.113	Astrobee-D
Midlatitude	A30.311-5	2 Dec 1975	1350:00.811	Astrobee-D
Midlatitude	A30.311-7	2 Dec 1975	1559:59.761	Astrobee-D
Midlatitude	A30.205-7	3 Dec 1975	0059:00.499	Astrobee-D
ICECAP 75	IC503.22-1	26 February 1975	2250:00.027	Astrobee-D
ICECAP 75	IC503.14-3	1 March 1975	0100:00.020	Astrobee-D
ICECAP 75	IC506.14-2	4 March 1975	0739:30.025	Nike Javelin
ICECAP 75	IC507.11-1A	6 March 1975	0343:00.028	Nike Hydac
ICECAP 75	IC507.11-3	6 March 1975	0616:30.020	Nike Hydac
ICECAP 75	IC507.11-2A	10 March 1975	0912:20.040	Nike Hydac
ICECAP 75	IC511.21-1A	11 March 1975	0633:09.040	Honest John Nike Javelin
ICECAP 75	IC519.07-1B	12 March 1975	0748:10.035	Sergeant Hydac
EXCEDE	EX630.42-1	28 February 1976	0546:40.034	Sergeant Recruit

Figure 1

TELEMETRY ASSIGNMENTS

VEHICLE	PROBE	LINK FREQ.	SUBCARRIER
A18.006-2	LWIR CVF	2251.5	18
	LWIR CVF	2251.5	17
	LWIR CVF	2251.5	16
	LWIR CVF	2251.5	15
	LWIR CVF	2251.5	14
	LWIR CVF	2251.5	13
	Photometer (2914) V	2251.5	6
A10.205-2	SWIR CVF	2269.5	15
	SWIR CVF	2269.5	13
	Photometer (3914) V	2269.5	8
	Particle Counter	2269.5	18
A18.205-1	Photometer (3914) V	2241.5	6
	Radiometer (2.7μ) H	2241.5	10
	Radiometer (5.3μ) V	2241.5	9
	Radiometer (5.3μ) H	2241.5	12
	Radiometer (4.3μ) V	2241.5	7
	SWIR CVF (Hi)	2241.5	16
	SWIR CVF (Lo)	2241.5	13
	Particle Counter	2241.5	19
	Scintillator	2275.5	7
	Photometer (3466) H	2275.5	8
	Photometer (3800) H	2275.5	9
	Photometer (5577) H	2275.5	10
	Photometer (3914) H	2275.5	11
	Photometer (5199) H	2275.5	12
	Electrostatic Analyzer (Sweep)	2275.5	15
	Electrostatic Analyzer (Spectra)	2275.5	13
A18.006-4	LWIR CVF	2251.5	18
	LWIR CVF	2251.5	17
	LWIR CVF	2251.5	16
	LWIR CVF	2251.5	15
	LWIR CVF	2251.5	14
	LWIR CVF	2251.5	13
	Photometer	2251.5	6
A18.219-1	Particle Counters	2251.5	19
	SWIR CVF-Lo	2251.5	16
	SWIR CVF-Hi	2251.5	13
	RPA Ampere Output	2279.5	19
	RPA Mode	2279.5	6
	RPA Sweep	2279.5	5
	Radiometer (H) 1A	2251.5	12
	Radiometer (H) 1B	2251.5	10

Figure 2

TELEMETRY ASSIGNMENTS

VEHICLE	PROBE	LINK FREQ.	SUBCARRIER
A18.219-1	Radiometer	2251.5	7
	3914 Photometer (V)	2251.5	6
	Housekeeping Commutator	2251.5	11
	ESA Sweep	2279.5	15
	ESA Spectra	2279.5	13
	Photometer (H) 1	2279.5	12
	Photometer (H) 2	2279.5	11
	Photometer (H) 3	2279.5	10
	Photometer (H) 4	2279.5	9
	Photometer (H) 5	2279.5	8
	EDS	2279.5	7
NJ74-1	Commutator	2269.5	18
	SWIR CVF-Lo	2269.5	14
	SWIR CVF-Hi	2269.5	16
	Magnetometer	2269.5	15
A10.312-3	PFP	2279.5	16
	ESA Spectra	2279.5	13
	ESA Sweep	2279.5	15
	3914 Photometer	2279.5	6
	Particle Counters	2279.5	11
EX531.43-1	Radiometer (4.3μ)	2257.5	6
	Radiometer (2.7μ)	2257.5	7
	Radiometer (2.7μ)	2257.5	9
	Photometer (3914)	2257.5	8
	Photometer (5577)	2257.5	12
A30.311-8	Radiometer (1.98μ)	2269.5	16
	Radiometer (1.695μ)	2269.5	15
	Radiometer (1.98μ)	2269.5	14
	Radiometer (1.695μ)	2269.5	13
A30.311-5	Radiometer (1.98μ)	2269.5	16
	Radiometer (1.701μ)	2269.5	15
	Radiometer (1.701μ)	2269.5	14
	Radiometer (1.98μ)	2269.5	13
A30.311-7	Radiometer (1.98μ)	2269.5	16
	Radiometer (1.70μ)	2269.5	15
	Radiometer (1.98μ)	2269.5	14
	Radiometer (1.70μ)	2269.5	13
A30.205-7	Radiometer (1.696μ)	2269.5	13
	Radiometer (1.98μ)	2269.5	14
	Radiometer (1.696μ)	2269.5	15
	Radiometer (1.98μ)	2269.5	16

Figure 2 (Cont.)

TELEMETRY ASSIGNMENTS

VEHICLE	PROBE	LINK FREQ.	SUBCARRIER
IC503.22-1	Z-Theta	2269.5	16
	Magnetometer	2269.5	11
IC503.14-3	Radiometer (1.68μ)	2269.5	16
	Radiometer (1.98μ)	2269.5	15
	Radiometer (1.68μ)	2269.5	13
	Radiometer (1.98μ)	2269.5	12
	Magnetometer	2269.5	11
IC506.14-2	Radiometer (1.68μ)	2279.5	16
	Radiometer (1.98μ)	2279.5	15
	Radiometer (1.68μ)	2279.5	13
	Radiometer (1.98μ)	2279.5	12
	Magnetometer	2279.5	11
IC511.21-1A	Langmuir Probe	2279.5	20
	Langmuir Probe Sweep	2279.5	6
	Electrostatic Analyzer Sweep	2279.5	15
	Electrostatic Analyzer Output	2279.5	12
	Soft Electron Spectrometer	2279.5	11
	Soft Electron Spectrometer Sweep	2279.5	7
	Particle Counter	2279.5	10
	Housekeeping Commutator	2279.5	9
	Photometer (3914)	2279.5	5
IC507.11-1A	Radiometer (4.3μ-G1)	2279.5	17
	Radiometer (4.3μ-G2)	2279.5	16
	Radiometer (4.3μ-G3)	2279.5	15
	Radiometer (4.3μ-G4)	2279.5	13
	Radiometer (5.5μ-G1)	2279.5	12
	Radiometer (5.5μ-G2)	2279.5	11
	Radiometer (5.5μ-G3)	2279.5	10
	Radiometer (5.5μ-G4)	2279.5	9
	Radiometer (9.6μ-G1)	2279.5	8
	Radiometer (9.6μ-G2)	2279.5	7
	Radiometer (9.6μ-G3)	2279.5	6
	Radiometer (9.6μ-G4)	2279.5	5
IC519.07-1B	Particle Counter	2251.5	19
	SWIR-CVF-Lo	2251.5	16
	SWIR-CVF-Hi	2251.5	13
	Radiometer (5.3μ) Vert	2251.5	9
	Radiometer (4.3μ) Vert	2251.5	7
	Photometer (3914) Vert	2251.5	6
	Electrostatic Analyzer - Sweep	2279.5	15
	Electrostatic Analyzer	2279.5	13
	Photometer (3914) Hor.	2279.5	10
	Photometer (5577) Hor.	2279.5	9

Figure 2 (Cont.)

TELEMETRY ASSIGNMENTS

VEHICLE	PROBE	LINK FREQ.	SUBCARRIER
IC519.07-1B	EDS	2279.5	8
	FRP Photometer (Hi) Hor.	2279.5	11
	FRP Photometer (Lo) Hor.	2279.5	12
	Housekeeping Commutator	2251.5	11
IC507-11-3	Radiometer (4.3μ-G1)	2269.5	17
	Radiometer (4.3μ-G2)	2269.5	16
	Radiometer (4.3μ-G3)	2269.5	15
	Radiometer (4.3μ-G4)	2269.5	13
	Radiometer (5.5μ-G1)	2269.5	12
	Radiometer (5.5μ-G2)	2269.5	11
	Radiometer (5.5μ-G3)	2269.5	10
	Radiometer (5.5μ-G4)	2269.5	9
	Radiometer (9.6μ-G1)	2269.5	8
	Radiometer (9.6μ-G2)	2269.5	7
	Radiometer (9.6μ-G3)	2269.5	6
	Radiometer (9.6μ-G4)	2269.5	5
IC507.11-2A	Radiometer (7-12μ-G1)	2279.5	17
	Radiometer (7-12μ-G2)	2279.5	16
	Radiometer (7-12μ-G3)	2279.5	15
	Radiometer (7-12μ-G4)	2279.5	13
	Radiometer (5.6μ-G1)	2279.5	12
	Radiometer (5.6μ-G2)	2279.5	11
	Radiometer (5.6μ-G3)	2279.5	10
	Radiometer (5.6μ-G4)	2279.5	9
	Radiometer (9.6μ-G1)	2279.5	8
	Radiometer (9.6μ-G2)	2279.5	7
	Radiometer (9.6μ-G3)	2279.5	6
	Radiometer (9.6μ-G4)	2279.5	5
EX630.42-1	Radiometer (5.4μ) V	2215.5	5
	Radiometer (2.7μ) V	2215.5	6
	Radiometer (4.9μ) V	2215.5	7
	Radiometer (2.0μ) V	2215.5	8
	Radiometer (4.3μ) V	2215.5	9
	Radiometer (2.2μ) V	2215.5	10
	Radiometer (4.9μ) H	2215.5	11
	Radiometer (2.0μ) H	2215.5	12
	Radiometer (5.4μ) H	2215.5	13
	Radiometer (2.7μ) H	2215.5	15
	Radiometer (4.3μ) H	2215.5	16
	Radiometer (2.2μ) H	2215.5	17
	Photometer	2279.5	5
	Photometer	2279.5	6
	Photometer	2279.5	7
	Photometer	2279.5	8
	Photometer	2279.5	9

Figure 2 (Cont.)

TELEMETRY ASSIGNMENTS

VEHICLE	PROBE	LINK FREQ.	SUBCARRIER
EX630.42-1	Photometer	2251.5	6
	Photometer	2251.5	7
	Photometer	2251.5	8
	Photometer	2251.5	9
	Photometer	2251.5	4
	Photometer	2251.5	5
	Photometer	2279.5	16
	Photometer	2279.5	17
	Photometer	2279.5	18
	Photometer	2279.5	19
	Photometer	2251.5	10
	Photometer	2251.5	11
	Photometer	2251.5	12
	Photometer	2251.5	15
	Photometer	2251.5	16
	Photometer	2251.5	17
	Photometer	2251.5	18

Figure 2 (Cont.)

CHAPTER 2

DATA MANAGEMENT

2.0 Overview

During this contractual period, data was successfully processed from a large number of individual probes associated with various Air Force projects. In order to facilitate the management phase of this project, weekly meetings were held between the Contract Monitor and the on-site representative of the contract. In addition, a Rocket Data Coordination Committee (RDCC) was formed which included government and contractor personnel. The RDCC scheduled monthly meetings. In addition, the request form for all new problems was standardized and it was this request form which contained all information necessary to complete the first phase of any new problem.

2.1 Weekly Review Meeting

The Contract Monitor provided the day to day interface with the various task initiators. Information acquired and/or questions arising from this interface were brought to the attention of the senior analyst.

In addition, weekly meetings between the Contract Monitor and the on-site representative were held. The prime purpose of these meetings was to review the status of each problem and set realistic milestone dates for the completion of various phases associated with each problem. Difficulties encountered in the course of any effort were discussed and techniques for alleviating the difficulties were agreed upon. The impact of any problem areas on the milestone dates was discussed and, if necessary, the dates were revised. At these meetings, new processing and analysis requests or modifications to

existing requests were received. Whenever rearrangement of priorities was required as the result of any modification, a meeting was held with the Initiator to inform him of the impact. Parameters necessary to complete any task were brought up at the weekly meetings and these were obtained by the Contract Monitor. Also, any items to be prioritized for the presentation of papers were discussed and reasonable time tables were agreed upon.

As was mentioned in the overview, a standardized form was developed by SUA for the complete definition of the first phase of any new processing request. This form, called the Rocket Data Analysis Information (RDAI) form contained all information necessary to complete the initial phase of any effort and represented the agreement between SUA and the Space Data Analysis Laboratory on the work to be performed. The receipt of the RDAI form along with the associated digital data marked the initiation of efforts on any new task.

The RDAI form contains information relevant to the experiment, the Initiator, the vehicle, vehicle launch, telemetry data, attitude requirements, data bases and displayed outputs.

The first page of the RDAI form contains general information pertinent to the request. The name of the Initiator and the experiment title are the first two pieces of information. Launch information includes the name of the launch site, the launch data and time and the time period over which usable telemetry data was recorded. Vehicle information consists of the type of rocket flown and number of the vehicle. Telemetry facts are included on this page and consist of the link frequency and subcarrier assignments of all relevant data and the type of data on each subcarrier (PAM, PCM, or FM). For FM subcarriers, requested digitization rates and existence, or

non-existence, of in-flight calibration data are noted. For PAM data, the number of commutator words and the relative word positions within the data frame of the ground and full scale words are noted. PCM subcarrier information contained on this page includes the PCM bit rate, the number of bits per data word, the number of words in the data frame and the sync pattern.

When pre-launch calibrations exist for the pertinent subcarriers, they are noted on this general information page. The required start and stop times for all data processing and analysis efforts are contained on this page and they are strictly adhered to. When attitude data is required in the primary data base, all angles, (magnetic pitch angle, azimuth of line of sight of the instrument, elevation angle of the rocket axis, etc.) are defined.

The second page of the RDAI form is entitled DESCRIPTION OF EXPERIMENT AND ANALYSIS REQUIRED. The probe is normally described in overview form but when a detailed probe description is required, it is supplied. Analysis requirements are defined and when specific techniques are to be applied, they too are defined. Specific information relating to each subcarrier is detailed on this page and includes a summary of data quality, anticipated periods for probes with repeating data sets and waveforms to be used in pattern recognition. All parameters to be calculated are defined in detail.

The third page of the RDAI form contains data product information. All calibrations required in parameter calculations are contained on this page. Also, all output requirements are detailed. These requirements are divided into three categories: listings, plots and output data bases.

For listings, the calculated parameters, trajectory information and attitude angles are defined. When special formats or data rates are required they are specified.

Requests for plotted outputs are specified in terms of type (CRT or pen and ink), ordinate and abscissa parameters, axis type (linear or logarithmic), special annotation and additional scales (for example, many displays are requested which consist of an engineering unit output as a function of time with altitude noted). Whenever other specifics of output displays (e.g., length of axes) are necessary, they are defined.

The parameters to be contained in the primary data base are listed. When specific rates of individual parameters are required for data analysis, they are defined in this section. Attitudinal angles and position data such as trajectory and range which are to be contained in the primary data base are also included in this section.

In general, the RDAI form contains all the information necessary to produce the required outputs.

Upon receipt of the RDAI form from the Contract Monitor an immediate study of the task was conducted by the senior analyst. When questions relating to any portion of the request arose, they were brought to the attention of the Contract Monitor. If a meeting of the Rocket Data Coordination Committee was required in order to resolve the problem areas, the meeting was called. When all problem areas were removed, the approach to be taken in satisfying the requirements is defined by the senior analyst. This approach included overall data flow, specific techniques to be used, definition of new computer routines which were required and applicability

of existing routines. Once the approach to the problem was defined, a meeting was held with the Contract Monitor to review the approach and discuss all other aspects of the problem.

The weekly meetings and the standardization of the processing form provides an efficient means of exchanging and receiving information pertinent to the individual requests.

2.2 Rocket Data Coordination Committee

In order to provide an effective means for handling data requests, coordinating the effort of producing quality data products and defining structured data bases for use in the analysis of ionospheric phenomenae, a Rocket Data Coordination Committee (RDCC) was formed. This committee was composed of personnel from SUA (the Contract Monitor and alternate Contract Monitor), task initiators and their representatives and the on-site representative of this laboratory. RDCC meetings were found to be an excellent method of dealing with problems arising in the processing of large amounts of data (as was acquired from the various ICECAP, EXCEDE and mid-latitude twilight D projects).

In the early post launch period, meetings of the Rocket Data Coordination Committee were held to review the overall instrument performance and possible problem areas of all pertinent probes. Processing requests were received, in an overview fashion, prior to the formal submission of these requests by the Initiators to the Analysis and Simulation Branch.

Monthly meetings of the RDCC were held although more frequent meetings were held when requested by any of the members.

At the periodic meetings, current information pertaining to all projects was discussed. A review of each probe for which a processing request had been received was then undertaken in order that all parties may agree upon the direction of the work which was in progress.

A data status chart was developed to provide a quick-look status for each probe. This chart, one page per rocket, contained columns for the various aspects of the processing requirements. Columns were provided to note the completion of the RDAI form, the existence of the digital tape, trajectory and attitude status, telemetry voltage calibrations and the applications of same, sample data produced, final data processing and the production of the final data base. One data status chart existed for each rocket and the chart was continually updated in order that the latest information be available to all interested parties.

CHAPTER 3

DATA PROCESSING

3.0 Overview

The Space Data Analysis Laboratory of Boston College was contracted by the Analysis and Simulation Branch of AFGL to develop and implement reduction and analysis techniques and the associated computer software necessary for the creation and utilization of data bases from raw telemetry information. The raw telemetry data was acquired from various Air Force rocket projects.

In order to provide a cost effective means of rapidly processing volumes of raw telemetry data, a data processing system (DPS) was developed. The basic procedure used was that of systematizing as many phases of the processing as possible. Data bases were structured in a generalized format to allow for easy data retrieval and display and to allow for the correlation of engineering unit outputs from different probes.

The modular routine technique was applied throughout the DPS. Through the use of modular routines, the overall system is flexible and allows for optimum data flow. Unique individual routines are required to produce outputs for some tasks but through the use of the modular technique, common elements of diverse tasks are effected with generalized subroutines.

The modular technique is felt to be the most cost effective approach to be taken in the production of required outputs from such a wide range of experiments and vehicles.

The modular routines were stored on a subroutine library for easy call by individual user routines.

3.1 Data Processing System

The data processing system which was developed has had application for all ICECAP and EXCEDE projects. In addition, the system was used in the processing of data for any other requests received during the period of this contract. The generalized file structure has proven to be an efficient means of storing and retrieving data from large rocket programs where correlative studies were performed.

The flow of data through the DPS is depicted in Figure 3. In this figure, the functional flow is shown from acquisition of the raw telemetry signal through the creation of the final data products. The DPS may be most simply described if it is considered in two phases: in phase 1, all input files for the individual processing routines are created; in phase 2, the data processing and analysis routines are executed.

The following sections will provide detailed information on all program interfaces.

3.1.1 Telemetry and Tracking Data

The telemetry system aboard each vehicle was normally activated just prior to lift-off and continued to transmit data until impact. The data was telemetered in real time to ground receiving stations where it is recorded on analog tape. The analog data was then sent to AFGL for decommutation.

Tracking data was also recorded at the launch site and this data was used by the Orbital Determination Section of the Analysis and Simulation Branch at AFGL. Through their procedures, high accuracy positional

DDS (Phase 1)

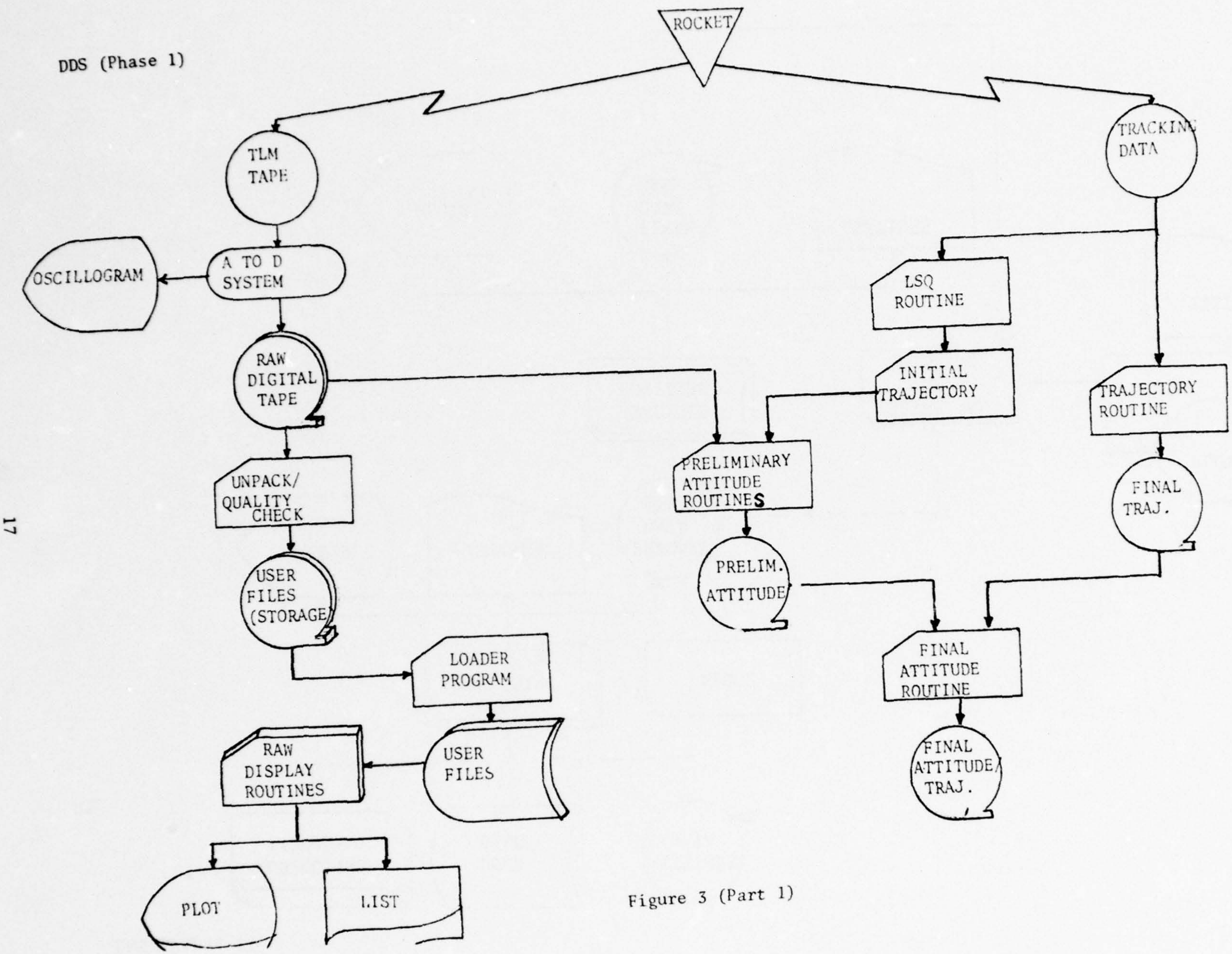

Figure 3 (Part 1)

DDS (Phase 2)

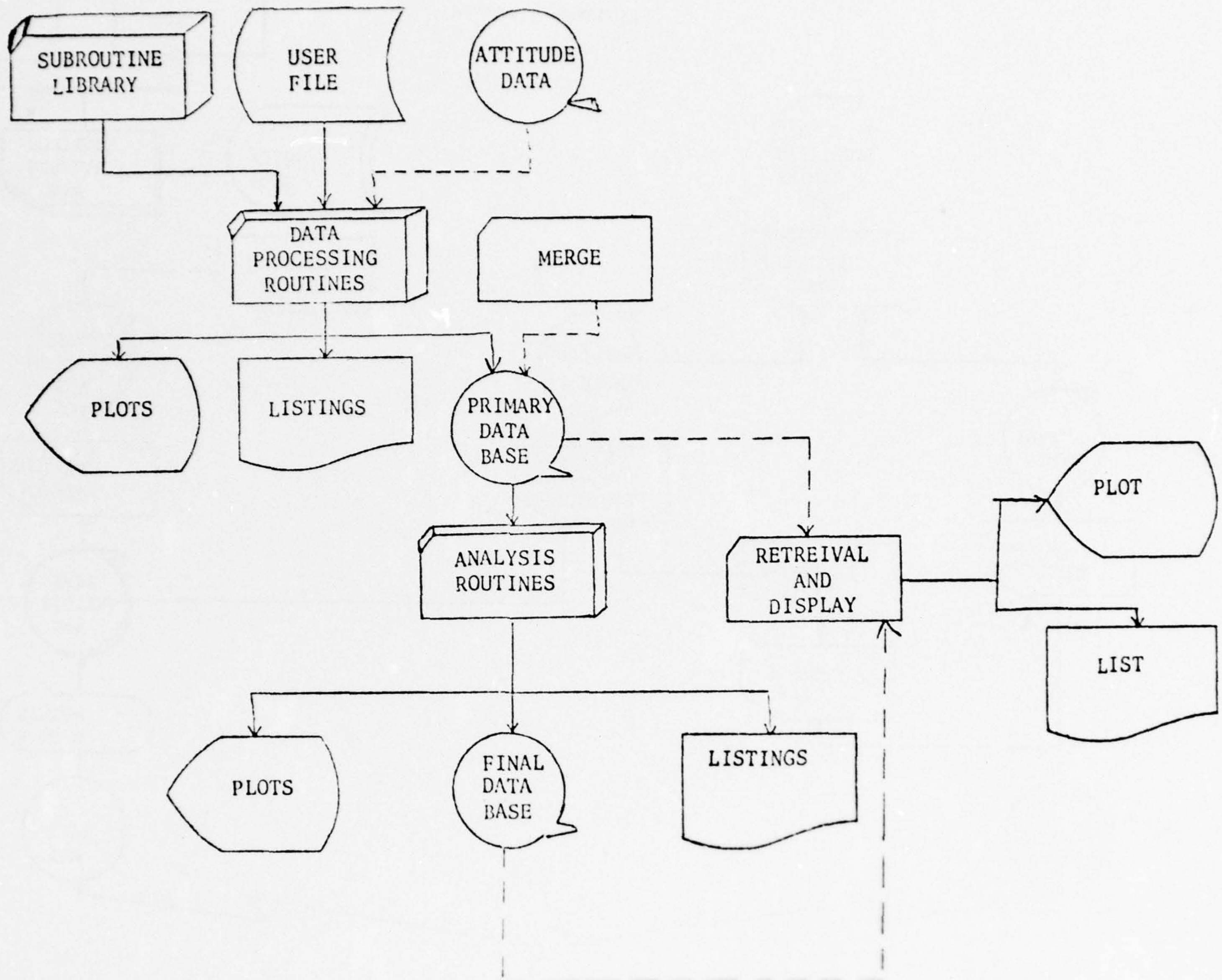

Figure 3 (Part 2)

parameters such as vehicle altitude, x, y and z position and velocity, longitude and latitude were derived. Final results were stored on magnetic tape for later merging with engineering unit and attitude data.

3.1.2 Analog-to-Digital System and User File Creation

All requests for the creation of digital files were submitted to the AFGL Decommutation Branch by the Contract Monitor. (Before any post-launch digital requests were processed by the Decommutation Branch, analog records were examined for those subcarriers which were recorded on more than one track and agreement was reached between the Contract Monitor, the Initiator and personnel from the Decommutation Branch as to the tape track to be selected for digitization.) Digital files were created by the Decommutation Branch using either of two analog-to-digital systems.

Raw digital files were created by the A to D Astrodata or Honeywell 316 computer systems. File formats were defined by the Decommutation Branch for each of the systems. The main system used by the Decommutation Branch for FM, PAM and PCM data during the period of this contract was the Honeywell 316 Data Acquisition system.

Digital file formats differ between the two A to D systems but also differ for FM and PCM data digitized on the Honeywell-316. Several elements of commonality do, however, exist for all digital files created by the Decommutation Branch. All output words are twelve bits in length. The A to D system on which the digital file was created is noted, in coded fashion in a specified word within the file. The digital request number is also contained in a data word. Each data record begins with the value of the major time at the start of the record. The major time consists of

hours, minutes and seconds in GMT. Following the major time, the remainder of the data record is comprised of minor times and associated data frames. The minor time is defined as the millisecond portion of GMT. Data frames contain requested subcarrier outputs in digital counts. The conversion of digital counts to telemetry volts is linear.

At the start of any task, the Contract Monitor supplies a data processing request and a digital tape containing the pertinent subcarrier data. The digital computer used in the processing of all requests is a CDC 6600.

Since the CDC 6600 is a fixed length 60 bit word digital computer and the data words produced on the A to D converters are 12 bits each, processing routines using the A to D files as input would be required to unpack data words, convert digital counts to telemetry voltage and also unpack major and minor time words to create GMT in total seconds. Further, since the processing routines are normally run several times, the frequent unpacking and conversion of the raw digital data is not a cost effective means of completing the processing request. For this reason, standard computer routines were used to unpack, edit and quality check the digital data contained on the files produced by the A to D systems.

Time word information was quality checked in the unpack program. Since time word jumps can occur, tests on successive minor time words were made to verify the goodness of time code data. Should a time jump occur, the GMT value and the duration of the time jump were printed on the output listing. For FM data, drifts in the digitization rate could also be detected by the time code quality checks.

For PCM and Pulse Amplitude Modulated (PAM) data, sync words were tested and any bad frames detected are time tagged in the output listing.

With the unpack, edit and quality check routines, major and minor time words were unpacked and converted to time in GMT (total seconds) or seconds from vehicle lift-off. A switch within the program allowed for the generation of either type of a time code. Data words representing digital counts were unpacked and converted to telemetry voltage according to the specifications received with the A to D file.

The output file created by this routine contained 60 bit data words and the format was generalized. Each logical record of the output file was of the form:

Word 1: N1 (integer): the number of words in a data frame.

Word 2: N2 (integer): the number of data frames in the logical record.

Word 3 through end of record: N1 words. The first word of each data frame was a time word.

Through the use of this generalized format, data may easily be input to standard processing routines as well as modular routines used to list and display the raw parameters.

The output file created by the unpack program, called the user file, was normally stored off-line on digital tape pending the coding of required processing routines. When the routine was ready for execution, the user file was loaded onto the computer system in the form of a permanent file for rapid online usage. The digital tape was archived at the completion of the processing request.

3.1.3 Data Processing Routines

Analysis techniques were defined as the first phase of any new problem. In general, once the analysis was defined for any particular probe, it had

application for all probes of that type flown during the period of the contract. Any modifications required to produce data bases from one vehicle to the next were normally the result of data associated problems such as instrument noise or the modification of the instrument wave pattern.

Several data processing routines were developed in order to produce the primary and final data bases for the raw digital data which was received. New routines and program modules were written whenever necessary but existing routines were modified and used whenever applicable.

Primary inputs to the data processing routines normally included the user file, the pertinent subroutine library routines, attitude data and trajectory data.

A least squares fit was applied to raw trajectory data and this fit was used until a final high accuracy trajectory file was produced by the AFGL Analysis and Simulation Branch, Orbital Determination Section.

Since the high accuracy attitude and trajectory data bases did not necessarily exist at the time that the experiment processing routines were being prepared, the least square trajectory and preliminary attitude, if it existed, were used as input.

In order to minimize the amount of coding required to process data from such large rocket programs, several modular routines were written. The modular routines developed included subroutines to input raw data, display parameters as functions of time with altitude noted, display parameters as functions of altitude, calibrate to engineering units, merge trajectory and attitude data, create standard file format data bases, smooth data bases, perform statistical evaluations, perform numerical integrations

and solve non-linear equations. The modular routines developed were stored on a subroutine library for easy call by the data processing and analysis routines.

Modular list and plot routines were developed and used in the data processing routines. Through their usage, requests for listings of various parameters were effected. Plot routines developed have the capability of producing pen and ink or CRT displays with linear or logarithmic scales on either axis and a wide range of annotation is allowed on the displays. Another routine was developed for the generation of polar coordinate displays of engineering unit outputs. This routine was useful in correlating the azimuthal effects of various atmospheric measurements.

The normal outputs from the data processing routines consisted of listings and displays of the calculated parameters. The data processing routines also created the primary data base which was generated in the generalized file format. If the initial primary data base did not contain final high accuracy ephemeris and attitude, a merge routine was used to produce the required primary data base. Once created, the primary data base was used as input to the analysis routines.

With most processing requests, segments of raw telemetry data and altitude were listed and plotted to verify correct subcarrier digitization. When digital data and oscillograms were produced from different analog tape tracks, any differences in the output stream could be detected through the use of the listed and plotted outputs. Another use of the list and plot routines was that of identifying in-flight calibration data. The technique of applying in-flight calibration pulses was frequently employed with FM data. One or more times during a flight 0v, 2.5v and 5v pulses

were imposed on data channels. User file data was listed at the times of the in-flight calibrations and the 0v, 2.5v and 5v data was examined. Corrections to the telemetry voltages contained on the user file were sometimes required. When corrections were required, the user file was input to a standard routine which was used to correct the telemetry values and create a new user file. This new user file was stored on-line but was also stored permanently off-line on digital tape.

Through the use of the modular routine technique, processing routines could be run in stand alone fashion with only the user file as input or the attitude and trajectory data could be merged within the processing routine by simple addition or deletion of callable subprograms. No major modifications to the processing programs were required and, thus, they remained flexible.

Another major advantage of the modular technique became evident when revisions to processing requests were received. The modifications could, in general, be effected by addition, deletion or replacement of modules with no major restructuring of the main computer routine required. This resulted in a minimum of programmer effort required to complete relatively major revision requests.

The processing requirements for individual probes have been detailed in previous publications and, hence, will not be included in this document.

3.1.4 Analysis Routines

A number of computer routines were written to perform various computations and data manipulations on parameters stored in the primary and final

data bases. These routines, designed to generate outputs to be used in the evaluation and interpretation of reduced parameters, were considered to be analysis routines.

Two examples of these routines will be cited in order to better understand the requirements in this phase of the DPS.

For radiometers and photometers mounted such that their field of view was approximately perpendicular to the spin axis, the instrument readouts reflected azimuthal effects. After final attitude was merged with the engineering unit data base, the data was sorted by vehicle spin. After sorting, the appropriate data base parameters were extracted and displays of the proper engineering units were generated over each 1 1/2 vehicle spins. Instrument azimuth and elevation angles over the spin period and time and altitude at the start of the spin were annotated on the display. Through the use of these plots, the azimuthal effects could be correlated with the measured parameters.

For electrostatic analyzer data, the main processing routine created a primary data base which contained, among other parameters, energy and differential flux. Proper analysis of the measurements required the computation of total energy and total flux. These parameters were computed using formulae involving integrals of energy and differential flux. Displays and listings of total energy and total flux as functions of time (with altitude noted) were then generated.

3.1.5 Data Retrieval and Display

Requests were frequently received for the generation of listings and/or displays of parameters contained in the final data bases. Since the

basic file structure of all primary and final data bases was identical, the requested parameters were easily input into routines which incorporated the requisite program modules and the requests were easily satisfied. Displays were generated in either pen and ink or CRT mode.

3.1.6 Summary

The successful Air Force projects ICECAP and EXCEDE resulted in the acquisition of large amounts of data providing measurements of the disturbed atmosphere. The data processing system and techniques defined in this chapter were used to successfully reduce and analyze the data and to create data bases for future study.

Data base formats and calibration data used to determine data base parameters are included in the appendix.

APPENDIX A

DATA BASES STANDARD BINARY FILES

IWD-JGRP FORMAT

ATTITUDE DATA FILE (VEHICLE A18.006-2)

IWD = 8, JGRP $\leq$ 250

DATA (1,J)	=	Time after launch (in seconds)
2		Altitude of the vehicle above sea level (in kilometers)
3		Velocity of the vehicle (in kilometers per second)
4		Magnitude of the Earth's Magnetic field vector (in milligauss)
5		Elevation of the vehicle axis measured up with respect to the horizontal plane of the launcher (in degrees)
6		Azimuth of the vehicle axis measured positive east of True North (in degrees)
7		Angle of attack between the vehicle axis and the vehicle velocity vector (in degrees)
8		Angle of attack between the vehicle axis and the Earth's Magnetic field vector (in degrees)

ATTITUDE DATA FILE (VEHICLE A10.205-2)

IWD=14, JGRP$\leq$250

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Velocity of the vehicle (in kilometers per second)

4 Magnitude of the Earth's Magnetic field vector (in milligauss)

The remaining quantities are as follows for each probe as noted below:

Data (5,J) = Elevation of the line of sight (los) of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

6 Azimuth of the los of the probe measured positive east or True North (in degrees)

7 Angle of attack between the los of the probe and the vehicle velocity vector (in degrees)

8 Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

9 Angle of attack between the los of the probe and the sun line vector (in degrees)

The probes are ordered, as follows:

1 Rocket axis

2 Particle counter

Tape A45317

ATTITUDE DATA FILE (VEHICLE A18.205-1)

IWD=40, JGRP≤250

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Velocity of the vehicle (in kilometers per second)

4 Magnitude of the Earth's Magnetic field vector (in milligauss)

The remaining quantities are as follows for each probe as noted below:

Data (5,J) = Elevation of the line of sight (los) of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

6 Azimuth of the los of the probe measured positive east of True North (in degrees)

7 Angle of attack between the los of the probe and the vehicle velocity vector (in degrees)

8 Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

9 Angle of attack between the los of the probe and the sun line vector (in degrees)

The probes are ordered, as follows:

1 Rocket axis

2 Gyro Notch

3 Photometer

4 ESA

5 EDS

6 Particle Counter

7 Electron Spectrometer

8 Plasma Frequency

9 Langmuir

ATTITUDE DATA FILE (VEHICLE A18.006-4)

IWD=9, JGRP$\leq$250

DATA (1,J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Velocity of the vehicle (in kilometers per second)
4	Magnitude of the Earth's Magnetic field vector (in milligauss)
5	Elevation of the vehicle axis measured up with respect to the horizontal plane of the launcher (in degrees)
6	Azimuth of the vehicle axis measured positive east of True North (in degrees)
7	Angle of attack between the vehicle axis and the vehicle velocity vector (in degrees)
8	Angle of attack between the vehicle axis and the Earth's Magnetic field vector (in degrees)
9	Angle of attack between the vehicle axis and the sun line vector (in degrees)

Tape AP4598

ATTITUDE DATA FILE (VEHICLE A18.219-1)

IWD=49, JGRP$\leq$250

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Velocity of the vehicle (in kilometers per second)

4 Magnitude of the Earth's Magnetic field vector (in milligauss)

The remaining quantities are as follows for each probe as noted below:

Data (5,J) = Elevation of the line of sight (los) of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

6 Azimuth of the los of the probe measured positive east of True North (in degrees)

7 Angle of attack between the los of the probe and the vehicle velocity vector (in degrees)

8 Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

9 Angle of attack between the los of the probe and the sun line vector (in degrees)

The probes are ordered, as follows:

1 Rocket axis

2 Magnetometer

3 Electrostatic analyzer

4 Particle counter

5 Electron spectrometer

6 Energy deposition scintillator

7 Plasma frequency probe

8 Langmuir probe

9 5.3 and 2.7 photometers

Tape AS4706

ATTITUDE DATA FILE (VEHICLE A10.312-3)

IWD=49, JGRP$\leq$250

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Velocity of the vehicle (in kilometers per second)

4 Magnitude of the Earth's Magnetic field vector (in milligauss)

The remaining quantities are as follows for each probe as noted below:

Data (5,J) = Elevation of the line of sight (los) of the probe measured up with respect to the horizontal plane of the launcher (in degrees).

6 Azimuth of the los of the probe measured positive east of True North (in degrees)

7 Angle of attack between the los of the probe and the vehicle velocity vector (in degrees)

8 Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

9 Angle of attack between the los of the probe and the sun line vector (in degrees)

The probes are ordered, as follows:

1 Rocket axis, 3914 photometer

2 Magnetometer

3 Electrostatic analyzer

4 Langmuir probe

5 Plasma frequency probe

6 Particle counter

7 Harp

8 E Field 1

9 E Field 2

Tape AP4765

ATTITUDE DATA FILE (VEHICLE EX531.43-1)

IWD=29, JGRP≤72

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Velocity of the vehicle (in kilometers per second)

4 Magnitude of the Earth's Magnetic field vector (in milligauss)

The remaining quantities are as follows for each probe as noted below:

Data (5,J) = Elevation of the line of sight (los) of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

6 Azimuth of the los of the probe measured positive east of True North (in degrees)

7 Angle of attack between the los of the probe and the vehicle velocity vector (in degrees)

8 Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

9 Angle of attack between the los of the probe and the sun line vector (in degrees)

The probes are ordered, as follows:

1 Rocket axis

2 Magnetometer, side radiometers/photometers

3 Electrostatic analyzer

4 E-Beam 1 & 2

5 E-Beam 3

ATTITUDE DATA FILE (VEHICLE A30.311-7)

IWD=9, JGRP$\leq$50

DATA (1,J)	=	Time after launch (in seconds)
2		Azimuth of the vehicle axis measured positive east of True North (in degrees)
3		Angle of attack between the vehicle axis and the sun-line vector (in degrees)
4		Angle of attack between the magnetometer and the Earth's Magnetic field vector (in degrees)
5		Elevation of the vehicle axis measured up with respect to the horizontal plane of the launcher (in degrees)
6		Angle of attack between the vehicle axis and the vehicle velocity vector (in degrees)
7		Angle of attack between the vehicle axis and the Earth's Magnetic field vector (in degrees)
8		Velocity of the vehicle (in kilometers per second)
9		Altitude of the vehicle above sea level (in kilometers)

ATTITUDE DATA FILE (VEHICLE A30.205-7)

IWD=9, JGRP$\leq$50

DATA (1,J) = Time after launch (in seconds)

2	Azimuth of the vehicle axis measured positive east of True North (in degrees)
3	Angle of attack between the vehicle axis and the sun-line vector (in degrees)
4	Angle of attack between the magnetometer and the Earth's Magnetic field vector (in degrees)
5	Elevation of the vehicle axis measured up with respect to the horizontal plane of the launcher (in degrees)
6	Angle of attack between the vehicle axis and the vehicle velocity vector (in degrees)
7	Angle of attack between the vehicle axis and the Earth's Magnetic field vector (in degrees)
8	Velocity of the vehicle (in kilometers per second)
9	Altitude of the vehicle above sea level (in kilometers)

Tape AS4880

ATTITUDE DATA FILE (VEHICLE IC503.22-1)

IWD=9, JGRP$\leq$50

DATA (1,J) = Time after launch (in seconds)

2 Azimuth of the vehicle axis measured positive east of True North (in degrees)

3 Angle of attack between the vehicle axis and the sun-line vector (in degrees)

4 Angle of attack between the magnetometer and the Earth's Magnetic field vector (in degrees)

5 Elevation of the vehicle axis measured up with respect to the horizontal plane of the launcher (in degrees)

6 Angle of attack between the vehicle axis and the vehicle velocity vector (in degrees)

7 Angle of attack between the vehicle axis and the Earth's Magnetic field vector (in degrees)

8 Velocity of the vehicle (in kilometers per second)

9 Altitude of the vehicle above sea level (in kilometers)

ATTITUDE DATA FILE (VEHICLE IC503.14-3)

IWD=9, JGRP$\leq$50

DATA (1,J)	=	Time after launch (in seconds)
2		Azimuth of the vehicle axis measured positive east of True North (in degrees)
3		Angle of attack between the vehicle axis and the sun-line vector (in degrees)
4		Angle of attack between the magnetometer and the Earth's Magnetic field vector (in degrees)
5		Elevation of the vehicle axis measured up with respect to the horizontal plane of the launcher (in degrees)
6		Angle of attack between the vehicle axis and the vehicle velocity vector (in degrees)
7		Angle of attack between the vehicle axis and the Earth's Magnetic field vector (in degrees)
8		Velocity of the vehicle (in kilometers per second)
9		Altitude of the vehicle above sea level (in kilometers)

Tape A4779A

ATTITUDE DATA FILE (VEHICLE IC507.11-1A)

IWD=9, JGRP≤250

DATA (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Velocity of the vehicle (in kilometers per second)

4 Magnitude of the Earth's Magnetic field vector (in milligauss)

5 Elevation of the vehicle axis measured up with respect to the horizontal plane of the launcher (in degrees)

6 Azimuth of the vehicle axis measured positive east of True North (in degrees)

7 Angle of attack between the vehicle axis and the vehicle velocity vector (in degrees)

8 Angle of attack between the vehicle axis and the Earth's Magnetic field vector (in degrees)

9 Angle of attack between the vehicle axis and the sun-line vector (in degrees)

Tape A4779C

ATTITUDE DATA FILE (VEHICLE IC507.11-3)

IWD=9, JGRP$\leq$250

DATA (1,J)	=	Time after launch (in seconds)
2		Altitude of the vehicle above sea level (in kilometers)
3		Velocity of the vehicle (in kilometers per second)
4		Magnitude of the Earth's Magnetic field vector (in milligauss)
5		Elevation of the vehicle axis measured up with respect to the horizontal plane of the launcher (in degrees)
6		Azimuth of the vehicle axis measured positive east of True North (in degrees)
7		Angle of attack between the vehicle axis and the vehicle velocity vector (in degrees)
8		Angle of attack between the vehicle axis and the Earth's Magnetic field vector (in degrees)
9		Angle of attack between the vehicle axis and the sun-line vector (in degrees)

ATTITUDE DATA FILE (VEHICLE IC507.11-2A)

IWD=9, JGRP$\leq$250

DATA (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Velocity of the vehicle (in kilometers per second)

4 Magnitude of the Earth's Magnetic field vector (in milligauss)

5 Elevation of the vehicle axis measured up with respect to the horizontal plane of the launcher (in degrees)

6 Azimuth of the vehicle axis measured positive east of True North (in degrees)

7 Angle of attack between the vehicle axis and the vehicle velocity vector (in degrees)

8 Angle of attack between the vehicle axis and the Earth's Magnetic field vector (in degrees)

9 Angle of attack between the vehicle axis and the sun-line vector (in degrees)

Tape A4782A

ATTITUDE DATA FILE (VEHICLE IC511.21-1A)

IWD=49, JGRP≤250

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Velocity of the vehicle (in kilometers per second)

4 Magnitude of the Earth's Magnetic field vector (in milligauss)

The remaining quantities are as follows for each probe as noted below:

Data (5,J) = Elevation of the line of sight (los) of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

6 Azimuth of the los of the probe measured positive east of True North (in degrees)

7 Angle of attack between the los of the probe and the vehicle velocity vector (in degrees)

8 Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

9 Angle of attack between the los of the probe and the sun line vector (in degrees)

The probes are ordered, as follows:

1 Rocket axis

2 Magnetometer

3 Electrostatic analyzer

4 Langmuir probe

5 Plasma frequency probe

6 Particle counter

7 Harp

8 E-Field (1)

9 E-Field (2)

ATTITUDE DATA FILE (VEHICLE IC519.07-1B)

IWD=39, JGRP≤72

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Velocity of the vehicle (in kilometers per second)

4 Magnitude of the Earth's Magnetic field vector (in milligauss)

The remaining quantities are as follows for each probe as noted below:

Data (5,J) = Elevation of the line of sight (los) of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

6 Azimuth of the los of the probe measured positive east of True North (in degrees)

7 Angle of attack between the los of the probe and the vehicle velocity vector (in degrees)

8 Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

9 Angle of attack between the los of the probe and the sun line vector (in degrees)

The probes are ordered, as follows:

1 Rocket axis

2 Magnetometer

3 Electrostatic analyzer

4 Particle counter

5 Electron spectrometer

6 Energy deposition scintillator

7 Photometers (FRP, 3914 & 5577)

Tape IC4001

COMMUTATOR (VEHICLE A18.219-1)

RAW DATA FILE

IWD=61, JGRP≤16

DATA (1,J) = Time (in seconds)

2	+28 Mon Main Bat	(in counts)
3	Pri Pyre Bat Mon	
4	Secondary Pyre Bat Mon	
5	ACS Press Mon	
6	ESA Door	Pre event 3.7V
7	Vert Phot Door	Post event 1V
8	Rad etc. Door	
9	Nose Tip Mon	Used also as Temp Mon
10	Rad Pop Cover	Pre event 3.7V
11	ES Slide Mon	Post event 1V
12	OV	
13	OV	
14	2.4 Mag Bias	
15	EDS Hi V Mon	
16	PC Hi V Mon Delayed	
17	PC HV Mon (Gieger)	
18	RPA Temp	
19	OV	
20	CVF E Temp	
21	CVF Det Temp	
22	Rad Vert E Temp	
23	Rad Vert D Temp	
24	Rad Horiz D Temp	
25	Rad Horiz E Temp	
26	OV	
27	3914 Phot (Vert) Temp	
28	2914 Phot (Vert) Hi V	
29	5200Å Phot Temp	Wideband (26Å) filter
30	5200Å Phot Hi V	Wideband (26Å) filter
31	5200Å Phot Temp	Narrowband (10Å filter

Tape IC4001

COMMUTATOR (VEHICLE A18.219-1)

RAW DATA FILE (Cont.)

IWD=61, JGRP≤16

DATA (32,J) =	Phot Hi V	5200Å (Narrowband) (in counts)
33	OV	
34	3914Å Photo Temp	
35	3914Å Photo Hi V	
36	5577Å Photo Temp	
37	5577Å Photo Hi V	
38	3466Å Photo Temp	
39	3466Å Photo Hi V	
40	OV	
41	ESA +28 Delayed	
42	ESA +28 Standby	
43	ESA Cover	
44	OV	
45	ESA +15V Mon	
46	ESA -15V Mon	
47	ESA PM H.V	
48	ESA Post Acc Hi V	
49	ESA Temp Mon	
50	OV	
51	MS .1 Volt Collector Current	
52	MS Mass Cal	
53	MS Emission Control	
54	MS HV Mon	
55	MS RF Sweep	
56	MS Bias Mon (Mite)	
57	OV	
58	+5V	
59	+5V	
60	+5V	
61	OV	

COMMUTATOR (VEHICLE IC511.21-1A)

RAW DATA FILE

IWD=61, JGRP$\leq$16

DATA (1, J) =	Time (in seconds)	
2	2.5V (in counts)	
3	OV	
4	ESA +28V Bypass mon.	
5	ESA +28V Standby mon.	
6	ESA +15V	
7	ESA -15V	
8	ESA Photo. H.V.	
9	ESA Acc. H.V.	
10	ESA Cover Mon.	
11	ESA Temp.	
12	OV	
13	PC Chaneltron H.V.	
14	PC Geiger H.V.	
15	OV	
16	Photometer Temp.	
17	Photometer H.V.	
18	OV	
19	ESA Door Mon.	.62 "on" 4.7 "off"
20	Platform Mon.	
21	PFP Door Mon.	
22	NT Mon.	
23	OV	
24	+28V Batt Mon.	
25	Pri. Pyro Batt. Mon.	
26	SEC Pyro Batt. Mon.	
27	OV	
28	OV	
29	OV	
30	OV	
31	OV	

COMMUTATOR (VEHICLE IC511.21-1A)

RAW DATA FILE (Cont.)

IWD=61, JGRP$\leq$16

DATA (32, J) =	ESA +28V Bypass (in counts)
33	ESA +28V Standby
34	ESA +28V
35	ESA -15V
36	ESA Photo. H.V.
37	ESA Acc. H.V.
38	ESA Cover Mon.
39	ESA Temp.
40	0V
41	P.C. Channeltron H.V.
42	P.C. Geiger H.V.
43	0V
44	Photo. Temp.
45	Photo. H.V.
46	0V
47	ESA Door Mon.
48	Platform Mon.
49	P.F.P. Door Mon.
50	N.T. Mon.
51	0V
52	+28V Batt. Mon.
53	Pri. Pyro. Batt. Mon.
54	Sec Pyro Batt. Mon.
55	0V
56	0V
57	0V
58	+5V
59	+5V
60	+5V
61	0V

COMMUTATOR (VEHICLE IC519.07-1B)

RAW DATA FILE

IWD=61, JGRP≤16

DATA (1, J) =	Time (in seconds)
2	+28V Battery (in counts)
3	Primary Battery
4	Secondary Battery
5	ACS Pressure Mon.
6	ESA Door
7	NR4-1 Door
8	Vertical Photometer Door
9	Nosetip Separation Mon.
10	OV
11	ES Slide
12	OV
13	OV
14	Magnetometer Bias
15	EDS High Voltage
16	PC High Voltage
17	PC High Voltage Geiger
18	RPA Temp.
19	OV
20	NR4-2 (Vert) Motor Mon.
21	NR4-2 (Vert) CF Temp.
22	NR4-2 (Vert) Baffle Temp.
23	NS4 CF Temp.
24	NS4 Baffle Temp.
25	NS4 Motor Temp.
26	OV
27	3914Å Photometer (Vert.) Temp.
28	3914Å Photometer (Vert.) High Voltage
29	Photometer Temp.
30	Photometer High Voltage

COMMUTATOR (VEHICLE IC519.07-1B)

RAW DATA FILE (Cont.)

IWD=61, JGRP≤16

DATA (31, J) =	Photometer Temperature (in counts)
32	Photometer High Voltage
33	OV
34	Film Photometer Temp.
35	Film Photometer High Voltage
36	NR4-1 (Horizontal) Motor Monitor
37	NR4-1 CF Temperature
38	NR4-1 Baffle Temperature
39	NR4-1 Temperature
40	OV
41	ESA +28V Delayed
42	ESA +28V Standby
43	ESA Cover Monitor
44	ESA OV
45	ESA +15V
46	ESA -15V
47	ESA PM High Voltage Monitor
48	ESA Post Accelerator High Voltage
49	ESA Temperature
50	OV
51	MS Collector Current
52	MS Mass Calibration
53	MS Emission Current
54	MS High Voltage
55	MS Sweep RF
56	MS Mode Monitor
57	OV
58	+5V
59	+5V
60	+5V
61	OV

ENERGY DEPOSITION SCINTILLATOR (VEHICLE A18.205-1)

RAW DATA FILE

IWD=13, JGRP=77

Data (1,J)	=	Time (in seconds)
2		TM voltage data-subcarrier #7 (spectral data channel)
3		4
4		7
5		4
6		7
7		4
8		7
9		4
10		7
11		4
12		7
13		4

ENERGY DEPOSITION SCINTILLATOR (VEHICLE A18.205-1)

PRIMARY DATA BASE

IWD=7, JGRP$\leq$50

Data (1,J) =		Time after launch (in seconds)
	2	Altitude of the vehicle above sea level (in kilometers)
	3	Azimuth of the los of the EDS measured positive east of True North (in degrees)
	4	Elevation of the los of the EDS measured up with respect to the horizontal plane of the launcher (in degrees)
	5	The angle of attack between the los of the EDS and the Earth's Magnetic field vector (in degrees)
	6	TLM voltage data - subcarrier 7
	7	Energy flux (in ergs-cm^{-2}-sec^{-1}-sr^{-1})

Tape IC4002

ENERGY DEPOSITION SCINTILLATOR (VEHICLE A18.219-1)

RAW DATA FILE

IWD=13, JGRP=77

Data (1,J)	=	Time (in seconds)
2		TM voltage data-subcarrier #7 (spectral data channel)
3		"
4		"
5		"
6		"
7		"
8		"
9		"
10		"
11		"
12		"
13		"

ENERGY DEPOSITION SCINTILLATOR (VEHICLE A18.219-1)

PRIMARY DATA BASE

IWD=7, JGRP$\leq$ 84

Data (1,J) =		Time after launch (in seconds)
	2	Altitude of the vehicle above sea level (in kilometers)
	3	Azimuth of the los of the EDS measured positive east of True North (in degrees)
	4	Elevation of the los of the EDS measured up with respect to the horizontal plane of the launcher (in degrees)
	5	The angle of attack between the los of the EDS and the Earth's Magnetic field vector (in degrees)
	6	TLM voltage data - subcarrier 7
	7	Energy flux (in ergs-cm^{-2}-sec^{-1}-sr^{-1})

ENERGY DEPOSITION SCINTILLATOR (VEHICLE IC519.07-1B)

RAW DATA FILE

IWD=13, JGRP=77

Data (1,J) =	Time (in seconds)	
2	TM voltage data-subcarrier #8 (spectral data channel)	
3	"	
4	"	
5	"	
6	"	
7	"	
8	"	
9	"	
10	"	
11	"	
12	"	
13	"	

ENERGY DEPOSITION SCINTILLATOR (VEHICLE IC519.07-1B)

PRIMARY DATA BASE

IWD=29, JGRP$\leq$77

The first quantities are:

DATA (1, J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the EDS measured positive east of True North (in degrees)

4 Elevation of the los of the EDS measured up with respect to the horizontal plane of the launcher (in degrees)

5 The supplement of the angle of attack between the base of the EDS and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated twelve times, are as follows:

DATA (6, J) = TM voltage data - subcarrier 8 (corrected for in-flight cals.)

7 Energy flux (in ergs-cm^{-2}-sec^{-1}-sr^{-1})

ELECTROSTATIC ANALYZER (VEHICLE A18.205-1)

RAW DATA FILE (PACKED)

IWD=11, JGRP=91

Data (1,J) =	Time (in seconds)		
2	TM data (in counts), subcarrier #	15	(sweep channel)
3		15	
4		15	
5		15	
6		13	(spectral data)
7		15	
8		15	
9		15	
10		15	
11		13	

ELECTROSTATIC ANALYZER (VEHICLE A18.205-1)

PRIMARY DATA BASE

IWD=8, JGRP = Number of Points in Each Scan

The first 2 quantities are:

DATA (1, J) = Scan number

DATA (2, J) = Average noise current (in amperes)

The remaining IWD quantities, repeated JGRP times, are

ARRAY (1, J) = Time after launch (in seconds)

2	Altitude of the vehicle above sea level (in kilometers)
3	Differential flux (in $(cm^2\text{-sec-sr-kev})^{-1}$)
4	Electron energy (in kev)
5	Spectral current (in amperes)
6	Supplement of the angle of attack between the loss of the ESA and the Earth's Magnetic field vector (in degrees)

ELECTROSTATIC ANALYZER (VEHICLE A18.219-1)

RAW DATA FILE (PACKED)

IWD=11, JGRP=91

Data (1,J)	= Time (in seconds)		
2	TM data (in counts), subcarrier	#15	(sweep channel)
3		15	
4		15	
5		15	
6		13	(spectral data)
7		15	
8		15	
9		15	
10		15	
11		13	

ELECTROSTATIC ANALYZER (VEHICLE A18.219-1)

PRIMARY DATA BASE

IWD=6, JGRP = Number of Points in Each Scan

The first 2 quantities are:

DATA (1, J) = Scan number

DATA (2, J) = Average noise current (in amperes)

The remaining IWD quantities, repeated JGRP times, and

ARRAY (1, J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Differential flux (in $(cm^2\text{-sec-sr-kev})^{-1}$)

4 Electron energy (in kev)

5 Spectral current (in amperes)

6 Supplement of the angle of attack between the los of the ESA and the Earth's Magnetic field vector (in degrees)

ELECTROSTATIC ANALYZER (VEHICLE A10.312-3)

RAW DATA FILE (PACKED)

IWD=11, JGRP=91

Data (1,J) =	Time (in seconds)		
2	TM data (in counts), subcarrier	#15	(sweep channel)
3		15	
4		15	
5		15	
6		13	(spectral data)
7		15	
8		15	
9		15	
10		15	
11		13	

ELECTROSTATIC ANALYZER (VEHICLE A10.312-3)

PRIMARY DATA BASE

IWD=8, JGRP = Number of Points in Each Scan

The first 2 quantities are:

DATA (1, J) = Scan number

DATA (2, J) = Average noise current (in amperes)

The remaining IWD quantities, repeated JGRP times, are

ARRAY (1, J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Differential flux (in $(cm^2\text{-sec-sr-kev})^{-1}$)

4 Electron energy (in kev)

5 Spectral current (in amperes)

6 Supplement of the angle of attack between the los of the ESA and the Earth's Magnetic field vector (in degrees)

7 Azimuth of the los of the ESA measured positive east of True North (in degrees)

8 Elevation of the los of the ESA measured positive with respect to the horizontal plane of the launcher (in degrees)

ELECTROSTATIC ANALYZER (VEHICLE IC511.21-1A)

RAW DATA FILE (PACKED)

IWD=11, JGRP=91

Data (1,J)	= Time (in seconds)		
2	TM data (in counts), subcarrier	#15	(sweep channel)
3		15	
4		15	
5		15	
6		12	(spectral data)
7		15	
8		15	
9		15	
10		15	
11		12	

Tape 1 of 2 IC5006
Tape 2 of 2 IC5007

ELECTROSTATIC ANALYZER (VEHICLE IC511.21-1A)

PRIMARY DATA BASE

IWD=8, JGRP = Number of Points in Each Scan

The first 2 quantities are:

DATA (1, J) = Scan Number

DATA (2, J) = Average noise current (in amperes)

The remaining IWD quantities, repeated JGRP times, are

ARRAY (1, J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Differential flux (in $(cm^2\text{-sec-sr-kev})^{-1}$)

4 Electron energy (in kev)

5 Spectral current (in amperes)

6 Supplement of the angle of attack between the los of the ESA and the Earth's Magnetic field vector (in degrees)

7 Azimuth of the los of the ESA measured positive east of True North (in degrees)

8 Elevation of the los of the ESA measured positive with respect to the horizontal plane of the launcher (in degrees)

ELECTROSTATIC ANALYZER (VEHICLE IC519.07-1B)

RAW DATA FILE (PACKED)

IWD=11, JGRP=91

Data (1,J)	=	Time (in seconds)	
2		TM data (in counts), subcarrier #15	(sweep channel)
3		15	
4		15	
5		15	
6		13	(spectral data)
7		15	
8		15	
9		15	
10		15	
11		13	

ELECTROSTATIC ANALYZER (VEHICLE IC519.07-1B)

PRIMARY DATA BASE

IWD=8, JGRP = Number of Points in Each Scan

The first 2 quantities are:

DATA (1, J) = Scan number

DATA (2, J) = Average noise current (in amperes)

The remaining IWD quantities, repeated JGRP times, are

ARRAY (1, J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Differential flux (in $(cm^2\text{-sec-sr-kev})^{-1}$)

4 Electron energy (in kev)

5 Spectral current (in amperes)

6 Supplement of the angle of attack between the los of the ESA and the Earth's Magnetic field vector (in degrees)

7 Azimuth of the los of the ESA measured positive east of True North (in degrees)

8 Elevation of the los of the ESA measured positive with respect to the horizontal plane of the launcher (in degrees)

LANGMUIR PROBE (VEHICLE IC511.21-1A)

RAW DATA FILE (PACKED)

IWD=13, JGRP≤77

DATA (1, J) =	Time (in seconds)	
2	TM Data (in counts), Subcarrier #20	(Spectral Data)
3	20	
4	20	
5	20	
6	20	
7	6	(Sweep Channel)
8	20	
9	20	
10	20	
11	20	
12	20	
13	6	

LANGMUIR PROBE (VEHICLE IC511.21-1A)

PRIMARY DATA BASE

IWD=10, JGRP = Number of Points in Each Sweep

The first quantity is:

DATA (1, J) = Sweep number

The remaining IWD quantities, repeated JGRP times, are:

ARRAY (1, J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Elevation of the los of the Langmuir probe measured positive with respect to the horizontal plane of the launcher (in degrees)
4	Azimuth of the los of the Langmuir probe measured positive east of True North (in degrees)
5	Supplement of the angle of attack between the los of the Langmuir probe and the Earth's magnetic field vector (in degrees)
6	Angle of attack between the los of the Langmuir probe and the vehicle's velocity vector (in degrees)
7	Sweep TM-volts-IRIG channel #6
8	Sweep voltages
9	Spectral TM-volts-IRIG channel #20
10	Current (amperes)

Tape IC4008

MAGNETOMETER (VEHICLE NJ74-1)

RAW DATA FILE

IWD=13, JGRP=77

Data (1,J)	=	Time (in seconds)
2		TM volts-IRIG channel # 15
3		"
4		"
5		"
6		"
7		"
8		"
9		"
10		"
11		"
12		"
13		"

Tape IC4009

MAGNETOMETER (VEHICLE NJ74-1)

PRIMARY DATA BASE

IWD=6, JGRP=78

Data (1,J) = Time after launch (in seconds)

2 Altitude above sea level (in kilometers)

3 Magnitude of Earth's Magnetic field vector (in milligauss)

4 Angle between the los of the magnetometer and the Earth's Magnetic field vector (in degrees)

5 Cosine of the angle between the los of the magnetometer and the Earth's Magnetic field vector

6 Angle between the rocket axis and the Earth's Magnetic field vector

Tape IC5013

MAGNETOMETER (VEHICLE IC503.22-1)

RAW DATA FILE

IWD=13, JGRP=77

Data (1,J)	=	Time (in seconds)
2		TM volts-IRIG channel #11
3		"
4		"
5		"
6		"
7		"
8		"
9		"
10		"
11		"
12		"
13		"

MAGNETOMETER (VEHICLE IC503.22-1)

PRIMARY DATA BASE

IWD=6, JGRP=78

Data (1,J)	=	Time after launch (in seconds)
2		Altitude above sea level (in kilometers)
3		Magnitude of Earth's Magnetic field vector (in milligauss)
4		Angle between the los of the magnetometer and the Earth's Magnetic field vector (in degrees)
5		Dummy Word
6		Angle between the rocket axis and the Earth's Magnetic field vector

Tape IC5015

MAGNETOMETER (VEHICLE IC503.14-3)

RAW DATA FILE

IWD=13, JGRP=77

Data (1,J)	=	Time (in seconds)
2		TM volts-IRIG channel #11
3		"
4		"
5		"
6		"
7		"
8		"
9		"
10		"
11		"
12		"
13		"

MAGNETOMETER (VEHICLE IC503.14-3)

PRIMARY DATA BASE

IWD=6, JGRP=78

Data (1,J) = Time after launch (in seconds)

2 Altitude above sea level (in kilometers)

3 Magnitude of Earth's Magnetic field vector (in milligauss)

4 Angle between the los of the magnetometer and the Earth's Magnetic field vector (in degrees)

5 Cosine of the angle between the los of the magnetometer and the Earth's Magnetic field vector

6 Angle between the rocket axis and the Earth's Magnetic field vector

MAGNETOMETER (VEHICLE IC506.14-2)

RAW DATA FILE

IWD=13, JGRP=77

Data (1,J)	=	Time (in seconds)
2		TM volts-IRIG channel #11
3		"
4		"
5		"
6		"
7		"
8		"
9		"
10		"
11		"
12		"
13		"

MAGNETOMETER (VEHICLE IC506.14-2)

PRIMARY DATA BASE

IWD=6, JGRP=78

Data (1,J)	=	Time after launch (in seconds)
2		Altitude above sea level (in kilometers)
3		Magnitude of Earth's Magnetic field vector (in milligauss)
4		Angle between the los of the magnetometer and the Earth's Magnetic field vector (in degrees)
5		Cosine of the angle between the los of the magnetometer and the Earth's Magnetic field vector
6		Angle between the rocket axis and the Earth's Magnetic field vector

PARTICLE COUNTER (VEHICLE A10.205-2)

RAW DATA FILE

IWD=17, JGRP$\leq$59

Data (1,J) =	Time (seconds)	
2	5 volt reference (in counts)	
3	0	
4	Quantity measurement of electrons with energy $\geq$28 kev (in counts)	
5		90
6		17
7		42
8		9
9		4.5
10		28
11		90
12		17
13		42
14		9
15	0 volt reference (in counts)	
16	5	
17	5	

PARTICLE COUNTER (VEHICLE A10.205-2)

PRIMARY DATA BASE

IWD=18, JGRP≤118

Data (1,J) = Time after launch (in seconds)

2	Altitude of the vehicle above sea level (in kilometers)
3	Supplement of the angle of attack between the los of the particle counter and the Earth's Magnetic field vector (in degrees)
4	Azimuth of the los of the particle counter measured positive east of True North (in degrees)
5	Elevation of the los of the particle counter measured up with respect to the horizontal plane of the launcher (in degrees)
6	TM voltage data
7	Observed counts (N_o)
8	The quantity, ρ X N_o
9	True counts (N_T) for ρ
10	Flux for ρ_1
11	The quantity, ρ_2 X N_o
12	True counts (N_T) for ρ_2
13	Flux for ρ_2
14	The quantity, ρ_3 X N_o
15	True counts (N_T) for ρ_3
16	Flux for ρ_3
17	1/(observed counts)
18	Observed flux

N.B. The data base, as noted above, consists of six files containing the processed data for energy's $\geq$ 28, 90, 17, 42, 9 and 4.5 kevs, respectively.

PARTICLE COUNTER (VEHICLE A18.205-1)

RAW DATA FILE

IWD=17, JGRP≤59

Data (1,J)	=	Time (seconds)	
2		5 volt reference (in counts)	
3		0	
4		Quantity measurement of electrons with energy ≥28 kev (in counts)	
5			90
6			17
7			42
8			9
9			4.5
10			28
11			90
12			17
13			42
14			9
15		0 volt reference (in counts)	
16		5	
17		5	

Tape IC3008

PARTICLE COUNTER (VEHICLE A18.205-1)

PRIMARY DATA BASE

IWD=18, JGRP<118

Data (1,J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Supplement of the angle of attack between the los of the particle counter and the Earth's Magnetic field vector (in degrees)
4	Azimuth of the los of the particle counter measured positive east of True North (in degrees)
5	Elevation of the los of the particle counter measured up with respect to the horizontal plane of the launcher (in degrees)
6	TM voltage data
7	Observed counts (N_o)
8	The quantity, ρ X N_o
9	True counts (N_T) for ρ
10	Flux for ρ_1
11	The quantity, ρ_2 X N_o
12	True counts (N_T) for ρ_2
13	Flux for ρ_2
14	The quantity, ρ_3 X N_o
15	True counts (N_T) for ρ_3
16	Flux for ρ_3
17	1/(Observed counts)
18	Observed flux

N.B. The data base, as noted above, consists of six files containing the processed data for energy's $\geq$ 28, 90, 17, 42, 9 and 4.5 kevs, respectively.

PARTICLE COUNTER (VEHICLE A18.219-1)

RAW DATA FILE

IWD=17, JGRP$\leq$59

Data (1,J) =	Time (seconds)	
2	5 volt reference (in counts)	
3	5	
4	5	
5	0	
6	Quantity measurement of electrons with energy $\geq$28 kev (in counts)	
7		90
8		17
9		42
10		9
11		4.5
12		28
13		90
14		17
15		42
16		9
17	0 volt reference (in counts)	

PARTICLE COUNTER (VEHICLE A18.219-1)

PRIMARY DATA BASE

IWD=18, JGRP<118

Data (1,J)	=	Time after launch (in seconds)
2		Altitude of the vehicle above sea level (in kilometers)
3		Supplement of the angle of attack between the los of the particle counter and the Earth's Magnetic field vector (in degrees)
4		Azimuth of the los of the particle counter measured positive east of True North (in degrees)
5		Elevation of the los of the particle counter measured up with respect to the horizontal plane of the launcher (in degrees)
6		TM voltage data
7		Observed counts (N_o)
8		The quantity, ρ X N_o
9		True counts (N_T) for ρ
10		Flux for ρ_1
11		The quantity, ρ_2 X N_o
12		True counts (N_T) for ρ_2
13		Flux for ρ_2
14		The quantity, ρ_3 X N_o
15		True counts (N_T) for ρ_3
16		Flux for ρ_3
17		1/(Observed counts)
18		Observed flux

N.B. The data base, as noted above, consists of six files containing the processed data for energy's $\geq$ 28, 90, 17, 42, 9 and 4.5 kevs. respectively.

Tape IC4012

PARTICLE COUNTER (VEHICLE A10.312-3)

RAW DATA FILE

IWD=17, JGRP$\leq$59

DATA (1, J) =	Time (in seconds)	
2	Quantity measurement of electrons with energy $\geq$	28 kev (in counts)
3		90
4		17
5		42
6		9
7		4.5
8		28
9		90
10		17
11		42
12		9
13	0 volt reference (in counts)	
14	5	
15	5	
16	5	
17	0	

PARTICLE COUNTER (VEHICLE A10.312-3)

PRIMARY DATA BASE

IWD=18, JGRP$\leq$118

Data (1,J)	=	Time after launch (in seconds)
2		Altitude of the vehicle above sea level (in kilometers)
3		Supplement of the angle of attack between the los of the particle counter and the Earth's Magnetic field vector (in degrees)
4		Azimuth of the los of the particle counter measured positive east of True North (in degrees)
5		Elevation of the los of the particle counter measured up with respect to the horizontal plane of the launcher (in degrees)
6		TM voltage data
7		Observed counts (N_o)
8		The quantity, ρ X N_o
9		True counts (N_T) for ρ
10		Flux for ρ_1
11		The quantity, ρ_2 X N_o
12		True counts (N_T) for ρ_2
13		Flux for ρ_2
14		The quantity, ρ_3 X N_o
15		True counts (N_T) for ρ_3
16		Flux for ρ_3
17		1/(Observed counts)
18		Observed flux

N.B. The data base, as noted above, consists of six files containing the processed data for energy's $\geq$ 28, 90, 17, 42, 9 and 4.5 kevs. respectively.

Tape IC5019

PARTICLE COUNTER (VEHICLE IC511.21-1A)

RAW DATA FILE

IWD=17, JGRP$\leq$59

DATA (1, J)	=	Time (in seconds)	
2		Quantity measurement of electrons with energy $\geq$ 4.5 kev (in counts)	
3			9
4			17
5			28
6			42
7			90
8			4.5
9			9
10			17
11			28
12			42
13		0 volt reference (in counts)	
14		5	
15		5	
16		5	
17		0	

PARTICLE COUNTER (VEHICLE IC511.21-1A)

PRIMARY DATA BASE

IWD=18, JGRP$\leq$118

Data (1,J)	=	Time after launch (in seconds)
2		Altitude of the vehicle above sea level (in kilometers)
3		Supplement of the angle of attack between the los of the particle counter and the Earth's Magnetic field vector (in degrees)
4		Azimuth of the los of the particle counter measured positive east of True North (in degrees)
5		Elevation of the los of the particle counter measured up with respect to the horizontal plane of the launcher (in degrees)
6		TM voltage data
7		Observed counts (N_o)
8		The quantity, ρ X N_o
9		True counts (N_T) for ρ
10		Flux for ρ_1
11		The quantity, ρ_2 X N_o
12		True counts (N_T) for ρ_2
13		Flux for ρ_2
14		The quantity, ρ_3 X N_o
15		True counts (N_T) for ρ_3
16		Flux for ρ_3
17		1/(Observed counts)
18		Observed flux

N.B. The data base, as noted above, consists of six files containing the processed data for energy's $\geq$ 4.5, 9, 17, 28, 42 and 90 kevs. respectively.

Tape IC5021

PARTICLE COUNTER (VEHICLE IC519.07-1B)

RAW DATA FILE

IWD=17, JGRP$\leq$59

DATA (1, J) =	Time (in seconds)	
2	Quantity measurement of electrons with energy $\geq$ 4.5 kev (in counts)	
3		9
4		17
5		28
6		42
7		90
8		4.5
9		9
10		17
11		28
12		42
13	0 volt reference (in counts)	
14	5	
15	5	
16	5	
17	0	

PARTICLE COUNTER (VEHICLE IC519.07-1B)

PRIMARY DATA BASE

IWD=18, JGRP≤118

Data (1,J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Supplement of the angle of attack between the los of the particle counter and the Earth's Magnetic field vector (in degrees)
4	Azimuth of the los of the particle counter measured positive east of True North (in degrees)
5	Elevation of the los of the particle counter measured up with respect to the horizontal plane of the launcher (in degrees)
6	TM voltage data
7	Observed counts (N_o)
8	The quantity, ρ X N_o
9	True counts (N_T) for ρ
10	Flux for ρ_1
11	The quantity, ρ_2 X N_o
12	True counts (N_T) for ρ_2
13	Flux for ρ_2
14	The quantity, ρ_3 X N_o
15	True counts (N_T) for ρ_3
16	Flux for ρ_3
17	1/(observed counts)
18	Observed flux

N.B. The data base, as noted above, consists of six files containing the processed data for energy's ≥ 4.5, 9, 17, 28, 42 & 90 kevs. respectively.

PLASMA FREQUENCY PROBE (VEHICLE A10.312-3)

RAW DATA FILE

IWD=4, JGRP$\leq$77

DATA (1, J) =	Time (in seconds)
2	Series (digital output in counts)
3	Parallel
4	Sync

PLASMA FREQUENCY PROBE (VEHICLE A10.312-3)

PRIMARY DATA BASE

IWD=5, JGRP$\leq$101

DATA (1, J)	=	Time (in seconds)
2		Altitude of the vehicle above sea level (in kilometers)
3		Series frequency
4		Parallel frequency
5		Electron density

RADIOMETERS & PHOTOMETERS (VEHICLE A18.006-2)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J) =	Time (in seconds)		
2	TM voltage data - link #1,	subcarrier #6	
3		"	"
4		"	"
5		"	"
6		"	"
7		"	"
8		"	"
9		"	"
10		"	"
11		"	"
12		"	"
13		"	"

AD-A042 261 BOSTON COLL CHESTNUT HILL MASS SPACE DATA ANALYSIS LAB F/G 9/2
DATA PROCESSING AND ANALYSIS FOR ICECAP AND RELATED PROJECTS.(U)
JAN 77 D E DELOREY, P N PRUNEAU F19628-73-C-0133
UNCLASSIFIED BC-SDAL-77-02 AFGL-TR-77-0058 NL

2 OF 3
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A042261

RADIOMETERS & PHOTOMETERS (VEHICLE A18.006-2)

PRIMARY DATA BASE

IWD=7 , JGRP$\leq$77

The first quantities are:

DATA (1, J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

DATA (6, J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megarayleighs)

The channels are ordered, as follows:

1 Link #1, subcarrier #6

RADIOMETERS & PHOTOMETERS (VEHICLE A10.205-2)

RAW DATA FILE

IWD=13, JGRP≤7

DATA (1, J)	= Time (in seconds)		
2	TM voltage data-link #1, subcarrier #8		
3		"	"
4		"	"
5		"	"
6		"	"
7		"	"
8		"	"
9		"	"
10		"	"
11		"	"
12		"	"
13		"	"

RADIOMETERS & PHOTOMETERS (VEHICLE A10.205-2)

PRIMARY DATA BASE

IWD=7, JGRP≤77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 The angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 Link #1, subcarrier #8

Tape IC3013

RADIOMETERS & PHOTOMETERS (VEHICLE A18.205-1)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J) =	Time (in seconds)		
2	TM voltage data-link #1, subcarrier		#12
3		"	10
4		"	12
5		"	10
6		"	12
7		"	10
8		"	12
9		"	10
10		"	12
11		"	10
12		"	12
13		"	10

RADIOMETERS & PHOTOMETERS (VEHICLE A18.205-1)

PRIMARY DATA BASE

IWD=9, JGRP≤77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 Link #1, subcarrier #12

2 10

Tape IC3015

RADIOMETERS & PHOTOMETERS (VEHICLE A18.205-1)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J)	= Time (in seconds)		
2	TM voltage data-link #1, subcarrier #		9
3		"	7
4		"	6
5		"	9
6		"	7
7		"	6
8		"	9
9		"	7
10		"	6
11		"	9
12		"	7
13		"	6

RADIOMETERS & PHOTOMETERS (VEHICLE A18.205-1)

PRIMARY DATA BASE

IWD=10, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1	Link #1, subcarrier #9
2	7
3	6

RADIOMETERS & PHOTOMETERS (VEHICLE A18.205-1)

RAW DATA FILE

IWD=13, JGRP≤77

DATA (1, J)	= Time (in seconds)	
2	TM voltage data-link #2, subcarrier #	12
3	"	11
4	"	12
5	"	11
6	"	12
7	"	11
8	"	12
9	"	11
10	"	12
11	"	11
12	"	12
13	"	11

Tape IC3018

RADIOMETERS & PHOTOMETERS (VEHICLE A18.205-1)

PRIMARY DATA BASE

IWD=9, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 Link #2, subcarrier #12

2 11

RADIOMETERS & PHOTOMETERS (VEHICLE A18.205-1)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J) = Time (in seconds)

2	TM voltage data-link #2, subcarrier #	10
3	"	9
4	"	8
5	"	10
6	"	9
7	"	8
8	"	10
9	"	9
10	"	8
11	"	10
12	"	9
13	"	8

RADIOMETERS & PHOTOMETERS (VEHICLE A18.205-1)

PRIMARY DATA BASE

IWD=11, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1	Link #2, subcarrier #10
2	9
3	8

RADIOMETERS & PHOTOMETERS (VEHICLE A18.006-4)

RAW DATA FILE

IWD=13, JGRP≤77

DATA (1, J)	= Time (in seconds)		
2	TM voltage data-link #1,	subcarrier #6	
3		"	"
4		"	"
5		"	"
6		"	"
7		"	"
8		"	"
9		"	"
10		"	"
11		"	"
12		"	"
13		"	"

RADIOMETERS & PHOTOMETERS (VEHICLE A18.006-4)

PRIMARY DATA BASE

IWD=7, JGRP≤77

The first quantities are:

Data (1,J)	=	Time after launch (in seconds)
2		Altitude of the vehicle above sea level (in kilometers)
3		Azimuth of the los of the probe measured positive east of True North (in degrees)
4		Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)
5		Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J)	=	TM voltage data corrected for in-flight calibrations
7		Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 Link #1, subcarrier #6

RADIOMETERS & PHOTOMETERS (VEHICLE A18.219-1)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J) = Time (in seconds)

2	TM voltage data-link #	1, subcarrier #	10
3		1	12
4		2	12
5		1	10
6		1	12
7		2	12
8		1	10
9		1	12
10		2	12
11		1	10
12		1	12
13		2	12

Tape IC4019

RADIOMETERS & PHOTOMETERS (VEHICLE A18.219-1)

PRIMARY DATA BASE

IWD=11, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1	Link #1,	subcarrier #10
2	1	12
3	2	12

Tape IC4020

RADIOMETERS & PHOTOMETERS (VEHICLE A18.219-1)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J)	= Time (in seconds)		
2	TM voltage data-link #1, subcarrier #		7
3		"	6
4		"	7
5		"	6
6		"	7
7		"	6
8		"	7
9		"	6
10		"	7
11		"	6
12		"	7
13		"	6

RADIOMETERS & PHOTOMETERS (VEHICLE A18.219-1)

PRIMARY DATA BASE

IWD=9, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 Link #1, subcarrier #7

2 6

RADIOMETERS & PHOTOMETERS (VEHICLE A18.219-1)

RAW DATA FILE

IWD=13, JGRP≤77

DATA (1, J) = Time (in seconds)

2	TM voltage data-link #2, subcarrier #	8
3	"	9
4	"	10
5	"	11
6	"	8
7	"	9
8	"	10
9	"	11
10	"	8
11	"	9
12	"	10
13	"	11

RADIOMETERS & PHOTOMETERS (VEHICLE A18.219-1)

PRIMARY DATA BASE

IWD=13, JGRP$\leq$77

The first quantities are:

Data (1,J)	=	Time after launch (in seconds)
2		Altitude of the vehicle above sea level (in kilometers)
3		Azimuth of the los of the probe measured positive east of True North (in degrees)
4		Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)
5		Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J)	=	TM voltage data corrected for in-flight calibrations
7		Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1	Link #2, subcarrier # 8
2	9
3	10
4	11

Tape IC4024

RADIOMETERS & PHOTOMETERS (VEHICLE A10.312-3)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J) =	Time (in seconds)		
2	TM voltage data-link #1, subcarrier #6		
3		"	"
4		"	"
5		"	"
6		"	"
7		"	"
8		"	"
9		"	"
10		"	"
11		"	"
12		"	"
13		"	"

RADIOMETERS & PHOTOMETERS (VEHICLE A10.312-3)

PRIMARY DATA BASE

IWD=7, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 Link #1, subcarrier #6

RADIOMETERS & PHOTOMETERS (VEHICLE EX531.43-1)

RAW DATA FILE (PACKED)

IWD=11, JGRP$\leq$91

DATA (1, J) =	Time (in seconds)	
2	TM data (in counts)-link #1, subcarrier #	12
3	"	9
4	"	8
5	"	7
6	"	6
7	"	12
8	"	9
9	"	8
10	"	7
11	"	6

RADIOMETERS & PHOTOMETERS (VEHICLE EX531.43-1)

PRIMARY DATA BASE

IWD=15, JGRP<91

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the vehicle axis and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1	Link #1, subcarrier #12
2	9
3	8
4	7
5	6

Tape IC5025

RADIOMETERS & PHOTOMETERS (VEHICLE A30.311-8)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J)	= Time (in seconds)	
2	TM voltage data-link #1, subcarrier #	13
3	"	14
4	"	15
5	"	16
6	"	13
7	"	14
8	"	15
9	"	16
10	"	13
11	"	14
12	"	15
13	"	16

N.B. The above data is contained on file #1 of 4 on this raw data tape.

RADIOMETERS & PHOTOMETERS (VEHICLE A30.311-5)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J)	= Time (in seconds)		
2	TM voltage data-link #1, subcarrier #		13
3		"	14
4		"	15
5		"	16
6		"	13
7		"	14
8		"	15
9		"	16
10		"	13
11		"	14
12		"	15
13		"	16

N.B. The above data is contained on file #2 of 4 on this raw data tape.

RADIOMETERS & PHOTOMETERS (VEHICLE A30.311-7)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J) = Time (in seconds)

2	TM voltage data-link #1, subcarrier #	13
3	"	14
4	"	15
5	"	16
6	"	13
7	"	14
8	"	15
9	"	16
10	"	13
11	"	14
12	"	15
13	"	16

N.B. The above data is contained on file #3 of 4 on this raw data tape.

RADIOMETERS & PHOTOMETERS (VEHICLE A30.311-7)

PRIMARY DATA BASE

IWD=29, JGRP≤77

The first quantities are:

Data (1,J)	=	Time after launch (in seconds)
2		Altitude of the vehicle above sea level (in kilometers)
3		Azimuth of the los of the probe measured positive east of True North (in degrees)
4		Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)
5		The angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J)	=	TM voltage data corrected for in-flight calibrations
7		Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1	Link #1, subcarrier #13
2	14
3	15
4	16

Groups of 4 subcarriers are repeated 3 times within each IWD frame.

RADIOMETERS & PHOTOMETERS (VEHICLE A30.205-7)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J) =	Time (in seconds)	
2	TM voltage data-link #1, subcarrier #	13
3	"	14
4	"	15
5	"	16
6	"	13
7	"	14
8	"	15
9	"	16
10	"	13
11	"	14
12	"	15
13	"	16

N.B. The above data is contained on file #4 of 4 on this raw data tape.

Tape IC5027

RADIOMETERS & PHOTOMETERS (VEHICLE A30.205-7)

PRIMARY DATA BASE

IWD=29, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 The angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1	Link #1, subcarrier #13
2	14
3	15
4	16

Groups of 4 subcarriers are repeated 3 times within each IWD frame.

RADIOMETERS & PHOTOMETERS (VEHICLE IC503.14-3)

RAW DATA FILE

IWD=13, JGRP≤77

DATA (1, J) = Time (in seconds)

2	TM voltage data-link #1, subcarrier	# 12
3	"	13
4	"	15
5	"	16
6	"	12
7	"	13
8	"	15
9	"	16
10	"	12
11	"	13
12	"	15
13	"	16

RADIOMETERS & PHOTOMETERS (VEHICLE IC503.14-3)

PRIMARY DATA BASE

IWD=12, JGRP$\leq$77

The first quantities are:

DATA (1, J)	=	Time after launch (in seconds)
2		Altitude of the vehicle above sea level (in kilometers)
3		Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)
4		Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel, as noted below, are as follows:

5	TM voltage data corrected for in-flight calibrations
6	Brightness (in kilorayleighs)

The following are the order of the channels:

1	Link #1, subcarrier #12 = axial radiometer
2	13
3	15
4	16

RADIOMETERS & PHOTOMETERS (VEHICLE IC506.14-2)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J) =	Time (in seconds)		
2	TM voltage data-link #1, subcarrier #		12
3		"	13
4		"	15
5		"	16
6		"	12
7		"	13
8		"	15
9		"	16
10		"	12
11		"	13
12		"	15
13		"	16

RADIOMETERS & PHOTOMETERS (VEHICLE IC506.14-2)

PRIMARY DATA BASE

IWD=12, JGRP$\leq$77

The first quantities are:

DATA (1, J) =		Time after launch (in seconds)
	2	Altitude of the vehicle above sea level (in kilometers)
	3	Angle between the los of the magnetometer and the Earth's Magnetic field vector (in degrees)
	4	Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel, as noted below, are as follows:

5	TM voltage data corrected for in-flight calibrations
6	Brightness (in kilorayleighs).

The following are the order of the channels:

1	Link #1, subcarrier #12 = axial radiometer
2	13
3	15
4	16

RADIOMETERS & PHOTOMETERS (VEHICLE IC507.11-1A)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J) =	Time (in seconds)		
2	TM voltage data-link #1, subcarrier		#17
3		"	16
4		"	15
5		"	13
6		"	17
7		"	16
8		"	15
9		"	13
10		"	17
11		"	16
12		"	15
13		"	13

N.B. The above data is contained on file #1 of 3 on this raw data tape.

File #2 contains link #1, subcarriers 12, 11, 10 & 9 repeated 3 times within each IWD frame.

File #3 (as above, with subcarriers 8, 7, 6 & 5, respectively)

Tape IC5033

RADIOMETERS & PHOTOMETERS (VEHICLE IC507.11-1A)

PRIMARY DATA BASE

IWD=26, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1	Link #1, subcarrier #17
2	16
3	15
4	13

Groups of 4 subcarriers are repeated 3 times within each IWD frame.

The above data is contained on file #1 of 3 on the raw data tape.

File #2 contains link #1, subcarriers 12, 11, 10 and 9 repeated 3 times within each IWD frame.

File #3 (as above, with subcarriers 8, 7, 6 and 5, respectively)

Tape IC5034

RADIOMETERS & PHOTOMETERS (VEHICLE IC507.11-3)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J)	= Time (in seconds)	
2	TM voltage data-link #1, subcarrier #	17
3	"	16
4	"	15
5	"	13
6	"	17
7	"	16
8	"	15
9	"	13
10	"	17
11	"	16
12	"	15
13	"	13

N.B. The above data is contained on file #1 of 3 on this raw data tape.

File #2 contains link #1, subcarriers 12, 11, 10 & 9 repeated 3 times within each IWD frame.

File #3 (as above, with subcarriers 8, 7, 6 & 5, respectively)

RADIOMETERS & PHOTOMETERS (VEHICLE IC507.11-3)

PRIMARY DATA BASE

IWD=26, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 Link #1, subcarrier	#17
2	16
3	15
4	13

Groups of 4 subcarriers are repeated 3 times within each IWD frame.

The above data is contained on file #1 of 3 on the raw data tape.

File #2 contains link #1, subcarriers 12, 11, 10 and 9 repeated 3 times within each IWD frame.

File #3 (as above, with subcarriers 8, 7, 6 and 5, respectively)

RADIOMETERS & PHOTOMETERS (VEHICLE IC507.11-2A)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J) = Time (in seconds)

2	TM voltage data-link #1, subcarrier #	17
3	"	16
4	"	15
5	"	13
6	"	17
7	"	16
8	"	15
9	"	13
10	"	17
11	"	16
12	"	15
13	"	13

N.B. The above data is contained on file #1 of 3 on this raw data tape.

File #2 contains link #1, subcarriers 12, 11, 10 & 9 repeated 3 times within each IWD frame.

File #3 (as above, with subcarrier 8, 7, 6 & 5, respectively)

RADIOMETERS & PHOTOMETERS (VEHICLE IC507.11-2A)

PRIMARY DATA BASE

IWD=26, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 Link #1, subcarrier #17

2 16

3 15

4 13

Groups of 4 subcarriers are repeated 3 times within each IWD frame.

The above data is contained on file #1 of 3 on this raw data tape.

File #2 contains link #1, subcarriers 12, 11, 10 and 9 repeated 3 times within each IWD frame.

File #3 (as above, with subcarriers 8, 7, 6 and 5, respectively)

N.B. In the case of subcarriers 13, 15, 16 & 17 brightness is in units of watts-cm^{-2}-str^{-1}.

RADIOMETERS & PHOTOMETERS (VEHICLE IC511.21-1A)

RAW DATA FILE

IWD=13, JGRP≤77

DATA (1, J) =	Time (in seconds)		
2	TM voltage data-link #1,	subcarrier # 5	
3	"	"	
4	"	"	
5	"	"	
6	"	"	
7	"	"	
8	"	"	
9	"	"	
10	"	"	
11	"	"	
12	"	"	
13	"	"	

RADIOMETERS & PHOTOMETERS (VEHICLE IC511.21-1A)

PRIMARY DATA BASE

IWD=15, JGRP_77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 The angle of attack between los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 Link #1, subcarrier #5

Quantities are repeated for the subcarrier 5 times within each IWD frame.

RADIOMETERS & PHOTOMETERS (VEHICLE IC519.07-1B)

RAW DATA FILE

IWD=13, JGRP≤77

DATA (1, J) =	Time (in seconds)		
2	TM voltage data-link #1,	subcarrier # 6	
3		"	"
4		"	"
5		"	"
6		"	"
7		"	"
8		"	"
9		"	"
10		"	"
11		"	"
12		"	"
13		"	"

RADIOMETERS & PHOTOMETERS (VEHICLE IC519.07-1B)

PRIMARY DATA BASE

IWD=29, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 *Link #1, subcarrier #6*

Quantities are repeated for the subcarrier 12 times within each IWD frame.

Tape IC5042

RADIOMETERS & PHOTOMETERS (VEHICLE IC519.07-1B)

RAW DATA FILE

IWD=13, JGRP≤77

DATA (1, J) =	Time (in seconds)		
2	TM voltage data-link #2, subcarrier #		10
3		"	9
4		"	10
5		"	9
6		"	10
7		"	9
8		"	10
9		"	9
10		"	10
11		"	9
12		"	10
13		"	9

RADIOMETERS & PHOTOMETERS (VEHICLE IC519.07-1B)

PRIMARY DATA BASE

IWD=17, JGRP_77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 Link #2, subcarrier #10

2 9

Groups of 2 subcarriers are repeated 3 times within each IWD frame.

RADIOMETERS & PHOTOMETERS (VEHICLE IC519.07-1B)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J) =	Time (in seconds)		
2	TM voltage data-link #1, subcarrier #		7
3		"	9
4		"	7
5		"	9
6		"	7
7		"	9
8		"	7
9		"	9
10		"	7
11		"	9
12		"	7
13		"	9

RADIOMETERS & PHOTOMETERS (VEHICLE IC519.07-1B)

PRIMARY DATA BASE

IWD=13, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 Link #1, subcarrier #7

2 9

Groups of 2 subcarriers are repeated 2 times within each IWD frame.

RADIOMETERS & PHOTOMETERS (VEHICLE IC519.07-1B)

RAW DATA FILE

IWD=13, JGRP$\leq$77

DATA (1, J)	= Time (in seconds)	
2	TM voltage data-link #2, subcarrier #	12
3	"	11
4	"	12
5	"	11
6	"	12
7	"	11
8	"	12
9	"	11
10	"	12
11	"	11
12	"	12
13	"	11

RADIOMETERS & PHOTOMETERS (VEHICLE IC519.07-1B)

PRIMARY DATA BASE

IWD=9, JGRP$\leq$77

The first quantities are:

Data (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Supplement of the angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

The remaining quantities, repeated for each channel as noted below, are as follows:

Data (6,J) = TM voltage data corrected for in-flight calibrations

7 Brightness (in units of rayleighs, kilorayleighs or megaraleighs)

The channels are ordered, as follows:

1 Link #2, subcarrier #12

2 11

Tape IC6001

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP I)

RAW DATA FILE (PACKED)

IWD=21, JGRP$\leq$48

DATA (1, J) = Time (in seconds)

2	TM data (in counts)-link #	2, subcarrier #	13
3		3	8
4		2	4
5		2	6
6		2	8
7		2	13
8		3	8
9		2	4
10		2	6
11		2	8
12		2	13
13		3	8
14		2	4
15		2	6
16		2	8
17		2	13
18		3	8
19		2	4
20		2	6
21		2	8

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP I)

PRIMARY DATA BASE

IWD=17, JGRP$\leq$48

The first quantities are:

DATA (1, J)	=	Time after launch (in seconds)
2		Altitude of the vehicle above sea level (in kilometers)
3		Azimuth of the los of the probe measured positive east of True North (in degrees)
4		Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)
5		Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)
6		Pulse cycle number
7		Data point index
8		TM voltage data-link #2, subcarrier #13 (sweep channel)
9		KV data-link #2, subcarrier #13

The remaining quantities, repeated for each channel, as noted below, are as follows:

DATA (10, J)	=	TM voltage data (spectral channel)
11		Brightness (in kilorayleighs).

The channels are ordered, as follows:

1	Link #3,	subcarrier #8
2	2	4
3	2	6
4	2	8

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP II)

RAW DATA FILE

IWD=21, JGRP≤48

DATA (1, J) = Time (in seconds)

2	TM voltage data-link #	2,	subcarrier #	13
3		2		5
4		2		7
5		3		5
6		3		6
7		2		13
8		2		5
9		2		7
10		3		5
11		3		6
12		2		13
13		2		5
14		2		7
15		3		5
16		3		6
17		2		13
18		2		5
19		2		7
20		3		5
21		3		6

Tape IC6004

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP II)

PRIMARY DATA BASE

IWD=17, JGRP$\leq$48

The first quantities are:

DATA (1, J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Azimuth of the los of the probe measured positive east of True North (in degrees)
4	Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)
5	Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)
6	Pulse cycle number
7	Data point index
8	TM voltage data-link #2, subcarrier #13 (sweep channel)
9	KV data-link #2, subcarrier #13

The remaining quantities, repeated for each channel, as noted below, are as follows:

DATA (10, J) =	TM voltage data (spectral channel)
11	Brightness (in kilorayleighs).

The channels are ordered, as follows:

1	Link #2, subcarrier #	5
2	2	7
3	3	5
4	3	6

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP III)

RAW DATA FILE (PACKED)

IWD=25, JGRP$\leq$40

DATA (1, J) = Time (in seconds)

2	TM data (in counts)-link #	2, subcarrier #	13
3		3	7
4		3	9
5		2	9
6		2	13
7		3	7
8		3	9
9		2	9
10		2	13
11		3	7
12		3	9
13		2	9
14		2	13
15		3	7
16		3	9
17		2	9
18		2	13
19		3	7
20		3	9
21		2	9
22		2	13
23		3	7
24		3	9
25		2	9

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP III)

PRIMARY DATA BASE

IWD=15, JGRP$\leq$40

The first quantities are:

DATA (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

6 Pulse cycle number

7 Data point index

8 TM voltage data-link #2, subcarrier #13 (sweep channel)

9 KV data-link #2, subcarrier #13

The remaining quantities, repeated for each channel, as noted below, are as follows:

DATA (10,J) = TM voltage data (spectral channel)

11 Brightness (in kilorayleighs).

The channels are ordered, as follows:

1	Link #3,	subcarrier #7
2	3	9
3	2	9

Tape IC6007

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP IV)

RAW DATA FILE

IWD=21, JGRP$\leq$48

DATA (1, J) = Time (in seconds)

2	TM voltage data-link #	2, subcarrier #	13
3		1	5
4		1	6
5		1	7
6		1	8
7		2	13
8		1	5
9		1	6
10		1	7
11		1	8
12		2	13
13		1	5
14		1	6
15		1	7
16		1	8
17		2	13
18		1	5
19		1	6
20		1	7
21		1	8

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP IV)

PRIMARY DATA BASE

IWD=17, JGRP$\leq$48

The first quantities are:

DATA (1, J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

6 Pulse cycle number

7 Data point index

8 TM voltage data-link #2, subcarrier #13 (sweep channel)

9 KV data-link #2, subcarrier #13

The remaining quantities, repeated for each channel, as noted below, are as follows:

DATA (10, J) = TM voltage data (spectral channel)

11 Brightness (in kilorayleighs).

The channels are ordered, as follows:

1	Link #1,	subcarrier #5
2	1	6
3	1	7
4	1	8

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1) GROUP V)

RAW DATA FILE (PACKED)

IWD=25, JGRP$\leq$40

DATA (1, J) =	Time (in seconds)		
2	TM data (in counts)-link #	2, subcarrier #	13
3		1	9
4		1	10
5		2	13
6		1	9
7		1	10
8		2	13
9		1	9
10		1	10
11		2	13
12		1	9
13		1	10
14		2	13
15		1	9
16		1	10
17		2	13
18		1	9
19		1	10
20		2	13
21		1	9
22		1	10
23		2	13
24		1	9
25		1	10

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP V)

PRIMARY DATA BASE

IWD=13, JGRP$\leq$40

The first quantities are:

DATA (1, J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Azimuth of the los of the probe measured positive east of True North (in degrees)
4	Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)
5	Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)
6	Pulse cycle number
7	Data point index
8	TM voltage data-link #2, subcarrier #13 (sweep channel)
9	KV data-link #2, subcarrier #13

The remaining quantities, repeated for each channel, as noted below, are as follows:

DATA (10, J) =	TM voltage data (spectral channel)
11	Brightness (in kilorayleighs).

The channels are ordered, as follows:

1	Link #1, subcarrier # 9		
2	1	.	10

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP VI)

RAW DATA FILE (PACKED)

IWD=16, JGRP$\leq$63

DATA (1, J)	= Time (in seconds)		
2	TM data (in counts)-link #	2, subcarrier #	13
3		3	19
4		2	17
5		2	11
6		2	15
7		2	13
8		3	19
9		2	17
10		2	11
11		2	15
12		2	13
13		3	19
14		2	17
15		2	11
16		2	15

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP VI)

PRIMARY DATA BASE

IWD=17, JGRP$\leq$63

The first quantities are:

DATA (1, J)	=	Time after launch (in seconds)
2		Altitude of the vehicle above sea level (in kilometers)
3		Azimuth of the los of the probe measured positive east of True North (in degrees)
4		Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)
5		Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)
6		Pulse cycle number
7		Data point index
8		TM voltage data-link #2, subcarrier #13 (sweep channel)
9		KV data-link #2, subcarrier #13

The remaining quantities, repeated for each channel, as noted below, are as follows:

DATA (10, J)	=	TM voltage data (spectral channel)
11		Brightness (in kilorayleighs)

The channels are ordered, as follows:

1	Link #3,	subcarrier #19
2	2	17
3	2	11
4	2	15

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP VII)

RAW DATA FILE (PACKED)

IWD=16, JGRP$\leq$63

DATA (1, J) = Time (in seconds)

2	TM data (in counts)-link #	2, subcarrier #	13
3		2	18
4		2	12
5		3	16
6		3	17
7		2	13
8		2	18
9		2	12
10		3	16
11		3	17
12		2	13
13		2	18
14		2	12
15		3	16
16		3	17

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP VII)

PRIMARY DATA BASE

IWD=17, JGRP≤63

The first quantities are:

DATA (1, J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Azimuth of the los of the probe measured positive east of True North (in degrees)
4	Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)
5	Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)
6	Pulse cycle number
7	Data point index
8	TM voltage data-link #2, subcarrier #13 (sweep channel)
9	KV data-link #2, subcarrier #13

The remaining quantities, repeated for each channel, as noted below, are as follows:

DATA (10, J) =	TM voltage data (spectral channel)
11	Brightness (in kilorayleighs).

The channels are ordered, as follows:

1	Link #2,	subcarrier #18
2	2	12
3	3	16
4	3	17

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP VIII)

RAW DATA FILE (PACKED)

IWD=17, JGRP$\leq$59

DATA (1, J) = Time (in seconds)

2	TM data (in counts)-link #2, subcarrier #13		
3		3	18
4		2	10
5		2	16
6		2	13
7		3	18
8		2	10
9		2	16
10		2	13
11		3	18
12		2	10
13		2	16
14		2	13
15		3	18
16		2	10
17		2	16

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP VIII)

PRIMARY DATA BASE

IWD=15, JGRP$\leq$59

The first quantities are:

DATA (1, J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Azimuth of the los of the probe measured positive east of True North (in degrees)

4 Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)

5 Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)

6 Pulse cycle number

7 Data point index

8 TM voltage data-link #2, subcarrier #13 (sweep channel)

9 KV data-link #2, subcarrier #13

The remaining quantities, repeated for each channel, as noted below, are as follows:

DATA (10, J) = TM voltage data (spectral channel)

11 Brightness (in kilorayleighs).

The channels are ordered, as follows:

1	Link #3,	subcarrier #18
2	2	10
3	2	16

Tape IC6017

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP IX)

RAW DATA FILE (PACKED)

IWD=16, JGRP$\leq$63

DATA (1, J) =	Time (in seconds)		
2	TM data (in counts)-link #2, subcarrier #13		
3		1	13
4		1	15
5		1	11
6		1	12
7		2	13
8		1	13
9		1	15
10		1	11
11		1	12
12		2	13
13		1	13
14		1	15
15		1	11
16		1	12

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP IX)

PRIMARY DATA BASE

IWD=17, JGRP_63

The first quantities are:

DATA (1, J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Azimuth of the los of the probe measured positive east of True North (in degrees)
4	Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)
5	Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)
6	Pulse cycle number
7	Data point index
8	TM voltage data-link #2, subcarrier #13 (sweep channel)
9	KV data-link #2, subcarrier #13

The remaining quantities, repeated for each channel, as noted below, are as follows:

DATA (10, J) =	TM voltage data (spectral channel)
11	Brightness (in kilorayleighs).

The channels are ordered, as follows:

1	Link #1,	subcarrier #13
2	1	15
3	1	11
4	1	12

Tape IC6019

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP X)

RAW DATA FILE (PACKED)

IWD=16, JGRP$\leq$63

DATA (1, J) = Time (in seconds)

2	TM data (in counts)-link #2, subcarrier #13	
3	1	16
4	1	17
5	2	13
6	1	16
7	1	17
8	2	13
9	1	16
10	1	17
11	2	13
12	1	16
13	1	17
14	2	13
15	1	16
16	1	17

Tape IC6020

RADIOMETERS & PHOTOMETERS (VEHICLE EX630.42-1 GROUP X)

PRIMARY DATA BASE

IWD=13, JGRP≤63

The first quantities are:

DATA (1, J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Azimuth of the los of the probe measured positive east of True North (in degrees)
4	Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)
5	Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)
6	Pulse cycle number
7	Data point index
8	TM voltage data-link #2, subcarrier #13 (sweep channel)
9	KV data-link #2, subcarrier #13

The remaining quantities, repeated for each channel, as noted below, are as follows:

DATA (10, J) =	TM voltage data (spectral channel)
11	Brightness (in kilorayleighs).

The channels are ordered, as follows:

1	Link #1, subcarrier #16	
2	1	17

RETARDING POTENTIAL ANALYZER (VEHICLE A18.219-1)

RAW DATA FILE

IWD=13, JGRP$\leq$77

Data (1,J)	= Time (in seconds)	
2	TM voltage data, subcarrier #19	(spectral data channel)
3	6	(RPA mode monitor)
4	5	(RPA sweep channel)
5	19	
6	6	
7	5	
8	19	
9	6	
10	5	
11	19	
12	6	
13	5	

RETARDING POTENTIAL ANALYZER (VEHICLE A18.219-1)

PRIMARY DATA BASE

IWD=5, JGRP$\leq$125

Data (1,J)	=	Time after launch (in seconds)
2		ion current (in amperes)
3		electron current (in amperes)
4		RPA mode monitor (in volts)
5		RPA sweep channel (in volts)

SOFT ELECTRON SPECTROMETER (VEHICLE IC511.21-1A)

RAW DATA FILE

IWD=13, JGRP≤77

DATA (1, J) = Time (in seconds)

2	TM voltage data, subcarrier	#11 (spectral data)
3		7 (sweep channel)
4		11
5		7
6		11
7		7
8		11
9		7
10		11
11		7
12		11
13		7

SOFT ELECTRON SPECTROMETER (VEHICLE IC511.21-1A)

PRIMARY DATA BASE

IWD=8, JGRP = Number of Points in Each Scan

The first quantity is:

DATA (1, J) = Scan number

The remaining IWS quantities, repeated JGRP times, are:

ARRAY (1, J) = Time after launch (in seconds)

2	Altitude of the vehicle above sea level (in kilometers)
3	Differential flux (in $(cm^2\text{-sec-sr-ev})^{-1}$)
4	Electron energy (in ev)
5	Counts/second
6	Supplement of the angle of attack between the los of the SES and the Earth's Magnetic field vector (in degrees)
7	Azimuth of the los of the SES measured positive east of True North (in degrees)
8	Elevation of the los of the SES measured positive with respect to the horizontal plane of the launcher (in degrees)

SWIR CVF SPECTROMETER (VEHICLE A10.205-2)

RAW DATA FILE

IWD=13, JGRP=77

Data (1,J)	= Time (in seconds)		
2	TM voltage data, subcarrier	#12	(high gain channel)
3		11	(low gain channel)
4		10	(position reference)
5		12	
6		11	
7		10	
8		12	
9		11	
10		10	
11		12	
12		11	
13		10	

Tape 1 of 4 IC3022
Tape 2 of 4 IC3023
Tape 3 of 4 IC3024
Tape 4 of 4 IC3025

SWIR CVF SPECTROMETER (VEHICLE A10.205-2)

PRIMARY DATA BASE

IWD=10, JGRP=NUMBER OF POINTS IN EACH SCAN

The first quantity is:

Data (1,J) = Scan number.

The remaining IWD quantities, repeated JGRP times, are:

Array (1,J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Elevation of the los of the spectrometer measured positive with respect to the horizontal plane of the launcher (in degrees)
4	Azimuth of the los of the spectrometer measured positive east of True North (in degrees)
5	Supplement of the angle of attack between the los of the spectrometer and the earth's magnetic field vector (in degrees)
6	Wavelength (in microns) - λ
7	Spectral TM volts-IRIG channel #13 (Hi-gain)
8	Spectral brightness for IRIG channel #13 (in megarayleighs/μm)
9	Sweep TM volts-IRIG channel #16 (Lo-gain)
10	Spectral brightness for IRIG channel #16 (in megarayleighs/μm)

SWIR CVF SPECTROMETER (VEHICLE A18.205-1)

RAW DATA FILE

IWD=13, JGRP=77

Data (1,J)	= Time (in seconds)		
2	TM voltage data, subcarrier	#16	(low gain channel)
3		13	(high gain channel)
4		16	
5		13	
6		16	
7		13	
8		16	
9		13	
10		16	
11		13	
12		16	
13		13	

Tape 1 of 5 IC3027
Tape 2 of 5 IC3028
Tape 3 of 5 IC3029
Tape 4 of 5 IC3030
Tape 5 of 5 IC3031

SWIR CVF SPECTROMETER (VEHICLE A18.205-1)

PRIMARY DATA BASE

IWD=10, JGRP=NUMBER OF POINTS IN EACH SCAN

The first quantity is:

Data (1,J) = Scan number.

The remaining IWD quantities, repeated JGRP times, are:

Array (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Elevation of the los of the spectrometer measured positive with respect to the horizontal plane of the launcher (in degrees)

4 Azimuth of the los of the spectrometer measured positive east of True North (in degrees)

5 Supplement of the angle of attack between the los of the spectrometer and the earth's magnetic field vector (in degrees)

6 Wavelength (in microns) - λ

7 Spectral TM volts-IRIG channel #13 (Hi-gain)

8 Spectral brightness for IRIG channel #13 (in megarayleighs/μm)

9 Sweep TM volts-IRIG channel #16 (Lo-gain)

10 Spectral brightness for IRIG channel #16 (in megarayleighs/μm)

SWIR CVF SPECTROMETER (VEHICLE A18.219-1)

RAW DATA FILE

IWD=13, JGRP=77

Data (I,J)	= Time (in seconds)		
2	TM voltage data, subcarrier	#16	(low gain channel)
3		13	(high gain channel)
4		16	
5		13	
6		16	
7		13	
8		16	
9		13	
10		16	
11		13	
12		16	
13		13	

Tape 1 of 4 IC4029
Tape 2 of 4 IC4030
Tape 3 of 4 IC4031
Tape 4 of 4 IC4032

SWIR CVF SPECTROMETER (VEHICLE A18.219-1)

PRIMARY DATA BASE

IWD=10, JGRP=NUMBER OF POINTS IN EACH SCAN

The first quantity is:

Data (1,J) = Scan number.

The remaining IWD quantities, repeated JGRP times, are:

Array (1,J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Elevation of the los of the spectrometer measured positive with respect to the horizontal plane of the launcher (in degrees)
4	Azimuth of the los of the spectrometer measured positive east of True North (in degrees)
5	Supplement of the angle of attack between the los of the spectrometer and the earth's magnetic field vector (in degrees)
6	Wavelength (in microns) - λ
7	Spectral TM volts-IRIG channel #13 (Hi-gain)
8	Spectral brightness for IRIG channel #13 (in megarayleighs/μm)
9	Sweep TM volts-IRIG channel #16 (Lo-gain)
10	Spectral brightness for IRIG channel #16 (in megarayleighs/μm)

SWIR CVF SPECTROMETER (VEHICLE NJ74-1)

RAW DATA FILE

IWD=13, JGRP=77

Data (1,J)	= Time (in seconds)		
2	TM voltage data, subcarrier	#14	(low gain channel)
3		16	(high gain channel)
4		14	
5		16	
6		14	
7		16	
8		14	
9		16	
10		14	
11		16	
12		14	
13		16	

Tape 1 of 4 IC4034
Tape 2 of 4 IC4035
Tape 3 of 4 IC4036
Tape 4 of 4 IC4037

SWIR CVF SPECTROMETER (VEHICLE NJ74-1)

PRIMARY DATA BASE

IWD=10, JGRP=NUMBER OF POINTS IN EACH SCAN

The first quantity is:

Data (1,J) = Scan number.

The remaining IWD quantities, repeated JGRP times, are:

Array (1,J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Elevation of the los of the spectrometer measured positive with respect to the horizontal plane of the launcher (in degrees)
4	Azimuth of the los of the spectrometer measured positive east of True North (in degrees)
5	Supplement of the angle of attack between the los of the spectrometer and the earth's magnetic field vector (in degrees)
6	Wavelength (in microns) - λ
7	Spectral TM volts-IRIG channel #13 (Hi-gain)
8	Spectral brightness for IRIG channel #13 (in megarayleighs/μm)
9	Sweep TM volts-IRIG channel #16 (Lo-gain)
10	Spectral brightness for IRIG channel #16 (in megarayleighs/μm)

SWIR CVF SPECTROMETER (VEHICLE IC519.07-1B)

RAW DATA FILE

IWD=13, JGRP=77

Data (1,J)	= Time (in seconds)		
2	TM voltage data, subcarrier	#16	(low gain channel)
3		13	(high gain channel)
4		16	
5		13	
6		16	
7		13	
8		16	
9		13	
10		16	
11		13	
12		16	
13		13	

Tape 1 of 5 IC5052
Tape 2 of 5 IC5053
Tape 3 of 5 IC5054
Tape 4 of 5 IC5055
Tape 5 of 5 IC5056

SWIR CVF SPECTROMETER (VEHICLE IC519.07-1B)

PRIMARY DATA BASE

IWD=12, JGRP=NUMBER OF POINTS IN EACH SCAN

The first quantity is:

Data (1,J) = Scan number.

The remaining IWD quantities, repeated JGRP times, are:

Array (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Elevation of the los of the spectrometer measured positive with respect to the horizontal plane of the launcher (in degrees)

4 Azimuth of the los of the spectrometer measured positive east of True North (in degrees)

5 Supplement of the angle of attack between the los of the spectrometer and the earth's magnetic field vector (in degrees)

6 Wavelength (in microns) - λ

7 Spectral TM volts-IRIG channel #13 (Hi-gain)

8 Spectral brightness for IRIG channel #13 (in megarayleighs/μm)

9 Sweep TM volts-IRIG channel #16 (Lo-gain)

10 Spectral brightness for IRIG channel #16 (in megarayleighs/μm)

11 Array (8) x $\Delta\lambda$

12 Array (10) x $\Delta\lambda$

N.B. Refer to list of constants for computation of $\Delta\lambda$.

Tape 1 of 2 IC3032
Tape 2 of 2 IC3033

LWIR CVF SPECTROMETER (VEHICLE A18.006-2)

RAW DATA FILE (PACKED)

IWD=25, JGRP=40

Data (1,J)	= Time (in seconds)		
2	TM data (in count), subcarrier	#13	(spectral data)
3		14	(spectral data)
4		15	"
5		16	"
6		17	(cal. channel)
7		18	(λ reference)
8		13	
9		14	
10		15	
11		16	
12		17	
13		18	
14		13	
15		14	
16		15	
17		16	
18		17	
19		18	
20		13	
21		14	
22		15	
23		16	
24		17	
25		18	

Tape 1 of 5 IC3034
Tape 2 of 5 IC3035
Tape 3 of 5 IC3036
Tape 4 of 5 IC3037
Tape 5 of 5 IC3038

LWIR CVF SPECTROMETER (VEHICLE A18.006-2)

PRIMARY DATA BASE

IWD=14, JGRP=NUMBER OF POINTS IN EACH SCAN

The first quantity is:

Data (1,J) = Scan number.

The remaining IWD quantities, repeated JGRP times, are:

Array (1,J) =	Time after launch (in seconds)
2	Altitude of the vehicle above sea level (in kilometers)
3	Elevation of the los of the spectrometer measured positive with respect to the horizontal plane of the launcher (in degrees)
4	Azimuth of the los of the spectrometer measured positive east of True North (in degrees)
5	Supplement of the angle of attack between the los of the spectrometer and the earth's magnetic field vector (in degrees)
6	Wavelength (in microns)
7	Spectral TM volts-IRIG channel #13
8	Spectral brightness for IRIG channel #13 (in megarayleighs/μm)
9	Spectral TM volts-IRIG channel #14
10	Spectral brightness for IRIG channel #14 (in megarayleighs/μm)
11	Spectral TM volts-IRIG channel #15
12	Spectral brightness for IRIG channel #15 (in megarayleighs/μm)
13	Spectral TM volts-IRIG channel #16
14	Spectral brightness for IRIG channel #16 (in megarayleighs/μm)

Tape 1 of 2 IC4038
Tape 2 of 2 IC4039

LWIR CVF SPECTROMETER (VEHICLE A18.006-4)

RAW DATA FILE (PACKED)

IWD=25, JGRP=40

Data (1,J) =	Time (in seconds)		
2	TM data (in count), subcarrier	#13	(spectral data)
3		14	(spectral data)
4		15	"
5		16	"
6		17	(cal. channel)
7		18	(λ reference)
8		13	
9		14	
10		15	
11		16	
12		17	
13		18	
14		13	
15		14	
16		15	
17		16	
18		17	
19		18	
20		13	
21		14	
22		15	
23		16	
24		17	
25		18	

Tape 1 of 6 IC4040
Tape 2 of 6 IC4041
Tape 3 of 6 IC4042
Tape 4 of 6 IC4043
Tape 5 of 6 IC4044
Tape 6 of 6 IC4045

LWIR CVF SPECTROMETER (VEHICLE A18.006-4)

PRIMARY DATA BASE

IWD=14, JGRP=NUMBER OF POINTS IN EACH SCAN

The first quantity is:

Data (1,J) = Scan number.

The remaining IWD quantities, repeated JGRP times, are:

Array (1,J) = Time after launch (in seconds)

2 Altitude of the vehicle above sea level (in kilometers)

3 Elevation of the los of the spectrometer measured positive with respect to the horizontal plane of the launcher (in degrees)

4 Azimuth of the los of the spectrometer measured positive east of True North (in degrees)

5 Supplement of the angle of attack between the los of the spectrometer and the earth's magnetic field vector (in degrees)

6 Wavelength (in microns)

7 Spectral TM volts-IRIG channel #13

8 Spectral brightness for IRIG channel #13 (in megarayleighs/μm)

9 Spectral TM volts-IRIG channel #14

10 Spectral brightness for IRIG channel #14 (in megarayleighs/μm)

11 Spectral TM volts-IRIG channel #15

12 Spectral brightness for IRIG channel #15 (in megarayleighs/μm)

13 Spectral TM volts-IRIG channel #16

14 Spectral brightness for IRIG channel #16 (in megarayleighs/μm)

Tape IC5057

Z-THETA PROBE (VEHICLE IC503.22-1)

RAW DATA FILE

IWD=11, JGRP$\leq$91

Data (1,J)	=	Time (in seconds)
2		0 volt reference (in counts)
3		Z1 - impedance (in counts)
4		Z10 - impedance (in counts
5		Ø-phase angle (in counts)
6		Mode A (in counts)
7		(Mode B)
8		0 volt reference (in counts)
9		5
10		5
11		5

Z-THETA PROBE (VEHICLE IC503.22-1)

PRIMARY DATA BASE

IWD=24, JGRP=1

DATA (1,J) =		Time (in seconds)
	2	Altitude of the vehicle above sea level (in kilometers)
	3	Azimuth of the los of the probe measured positive east of True North (in degrees)
	4	Elevation of the los of the probe measured up with respect to the horizontal plane of the launcher (in degrees)
	5	Angle of attack between the probe and the velocity vector (in degrees)
	6	Angle of attack between the los of the probe and the Earth's Magnetic field vector (in degrees)
	7	0 volt reference (in counts)
	8	Z1-impedance (in volts)
	9	Z10-impedance (in volts)
	10	ϕ-phase angle (in volts)
	11	Mode A (in counts)
	12	Mode B (in counts)
	13	0 volt reference (in counts)
	14	5
	15	5
	16	5
	17	Z1-impedance (in ohms)
	18	Z10-impedance (in ohms)
	19	ϕ-phase angle (in degrees)
	20	X1-reactance (in ohms)
	21	X10-reactance (in ohms)
	22	R1-resistance (in ohms)
	23	R10-resistance (in ohms)
	24	N1-density (in cm^{-3})

N.B. The data base consists of two files, as above, the first of which contains Mode A data, the second, Mode B data.

APPENDIX B

CALIBRATION DATA
&
INPUT PARAMETERS

ENERGY DEPOSITION SCINTILLATOR (VEHICLE A18.205-1)

CALIBRATION DATA

TELEMETRY VOLTAGE	ENERGY FLUX ($ergs\text{-}cm^{-2}\text{-}sec^{-1}\text{-}sr^{-1}$)
0.15	0.00×10^{-3}
0.17	1.42×10^{-3}
0.30	2.88×10^{-3}
0.45	4.35×10^{-3}
0.58	5.75×10^{-3}
0.70	7.22×10^{-3}
0.85	8.68×10^{-3}
0.97	10.10×10^{-3}
1.12	11.70×10^{-3}
1.80	1.80×10^{-2}
3.15	11.50×10^{-2}
3.19	1.30×10^{-1}
4.60	11.50×10^{-1}
4.67	1.35×10^{0}
5.26	5.75×10^{0}
5.27	12.00×10^{0}

ENERGY DEPOSITION SCINTILLATOR (VEHICLE A18.219-1)

CALIBRATION DATA

TELEMETRY VOLTAGE	ENERGY FLUX ($ergs\text{-}cm^{-2}\text{-}sec^{-1}\text{-}sr^{-1}$)
0.00	8.0×10^{-3}
1.18	1.9×10^{-1}
1.80	3.0×10^{-1}
3.15	1.7
3.18	1.8
4.56	1.7×10^{1}
4.70	1.8×10^{1}
5.30	9.5×10^{1}

ENERGY DEPOSITION SCINTILLATOR (VEHICLE IC519.07-1B)

CALIBRATION DATA

TELEMETRY VOLTAGE	ϕ ENERGY FLUX ($ergs\text{-}cm^{-2}\text{-}sec^{-1}\text{-}sr^{-1}$)
0.	0
1.71	25×10^{-2}
1.80	27×10^{-2}
3.12	16×10^{-1}
3.19	17×10^{-1}
4.64	163×10^{-1}
5.23	8×10^{1}
5.30	9×10^{1}
5.31	10×10^{1}

ELECTROSTATIC ANALYZER (VEHICLE A18.205-1)

CALIBRATION DATA

TM VOLTS	CURRENT (I) (AMPERES)
.41	2×10^{-11}
.44	5×10^{-11}
.48	1×10^{-10}
.88	2×10^{-10}
1.28	5×10^{-10}
1.45	1×10^{-9}
1.73	2×10^{-9}
2.27	5×10^{-9}
2.55	1×10^{-8}
2.71	2×10^{-8}
2.95	5×10^{-8}
3.24	1×10^{-7}
3.64	2×10^{-7}
3.93	5×10^{-7}
4.12	1×10^{-6}
4.25	2×10^{-6}
4.36	5×10^{-6}
4.46	1×10^{-5}
4.55	2×10^{-5}
4.64	5×10^{-5}
4.73	1×10^{-4}

ELECTROSTATIC ANALYZER (VEHICLE A18.205-1)

CALIBRATION DATA

SWEEP TIME (TS) (MSEC)	ELECTRON ENERGY (E) (KEV)
9.99	0.00
10	28.5
20	25.8
30	23.5
40	21.0
50	19.0
70	15.5
101	10.0
126	8.0
152	6.0
183	4.0
234	2.0
277	0.9

N.B. For all times > 277 msec., E = .9.

ELECTROSTATIC ANALYZER (VEHICLE A18.205-1)

CALIBRATION DATA

ELECTRON ENERGY (E) (KEV)	S'_E
3	.650
4	.680
5	.710
6	.745
7	.770
8	.795
9	.810
10	.820
11	.830
12	.835
13	.840
14	.850
15	.855
16	.860
17	.860
18	.860
19	.865
20	.870
21	.875
22	.880
23	.880
24	.885
25	.885
26	.890
27	.895
28	.900
29	.900
30	.905

AD-A042 261 BOSTON COLL CHESTNUT HILL MASS SPACE DATA ANALYSIS LAB F/G 9/2
DATA PROCESSING AND ANALYSIS FOR ICECAP AND RELATED PROJECTS.(U)
JAN 77 D E DELOREY, P N PRUNEAU F19628-73-C-0133
UNCLASSIFIED BC-SDAL-77-02 AFGL-TR-77-0058 NL

3 OF 3
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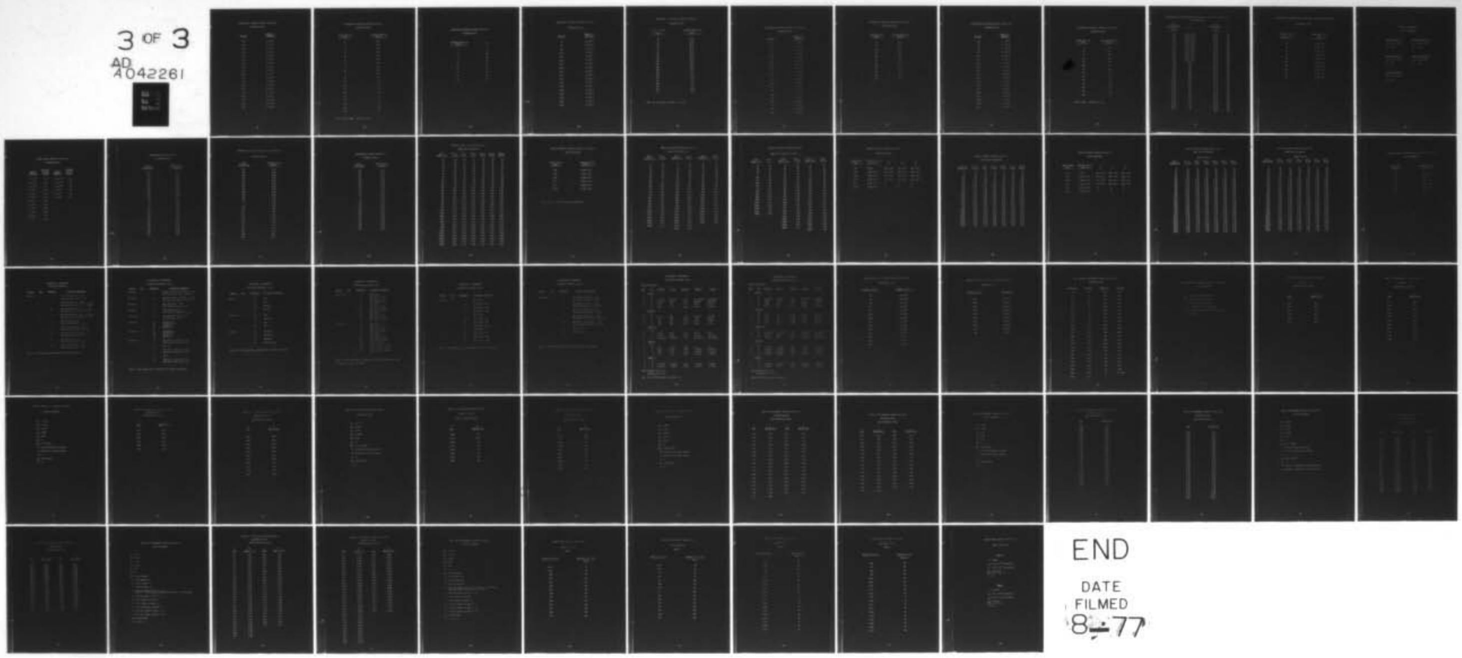

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ELECTROSTATIC ANALYZER (VEHICLE A18.219-1)

CALIBRATION DATA

TM VOLTS	CURRENT (I) (AMPERES)
4.88	1×10^{-4}
4.87	5×10^{-5}
4.84	2×10^{-5}
4.82	1×10^{-5}
4.68	5×10^{-6}
4.33	2×10^{-6}
4.11	1×10^{-6}
3.92	5×10^{-7}
3.57	2×10^{-7}
3.19	1×10^{-7}
2.82	5×10^{-8}
2.55	2×10^{-8}
2.40	1×10^{-8}
2.19	5×10^{-9}
1.65	2×10^{-9}
1.42	1×10^{-9}
1.25	5×10^{-10}
0.99	2×10^{-10}
0.64	1×10^{-10}

ELECTROSTATIC ANALYZER (VEHICLE A18.219-1)

CALIBRATION DATA

SWEEP TIME (TS) (MSEC)	ELECTRON ENERGY (E) (KEV)
10	30.1
15	28.3
25	25.4
30	24.5
40	22.5
50	20.5
60	18.0
70	16.5
80	14.5
90	13.0
100	11.5
120	9.2
140	7.3
160	5.8
180	4.6
200	3.6
220	2.7
240	2.0
260	1.5
280	1.0

N.B. For all times > 280, msec., E=1.

ELECTROSTATIC ANALYZER (VEHICLE A18.219-1)

CALIBRATION DATA

ELECTRON ENERGY (E) (KEV)	S'_E
3	.65
4	.66
6	.74
8	.79
10	.82
15	.85
20	.87
25	.89
30	.91

ELECTROSTATIC ANALYZER (VEHICLE A10.312-3)

CALIBRATION DATA

TM VOLTS	CURRENT (I) (AMPERES)
.17	1×10^{-10}
.35	2×10^{-10}
.85	5×10^{-10}
1.19	1×10^{-9}
1.36	2×10^{-9}
1.63	5×10^{-9}
2.06	1×10^{-8}
2.38	2×10^{-8}
2.62	5×10^{-8}
2.82	1×10^{-7}
3.10	2×10^{-7}
3.53	5×10^{-7}
3.89	1×10^{-6}
4.22	2×10^{-6}
4.50	5×10^{-6}
4.67	1×10^{-5}
4.86	2×10^{-5}
5.14	5×10^{-5}

ELECTROSTATIC ANALYZER (VEHICLE A10.312-3)

CALIBRATION DATA

SWEEP TIME (TS) (MSEC)	ELECTRON ENERGY (E) (KEV)
10	33.0
20	31.0
30	29.5
40	27.5
50	26.0
60	24.0
80	21.0
100	18.2
120	16.0
140	14.0
160	12.0
180	11.0
200	9.5
250	6.0
300	4.0
350	2.6
400	1.8
450	1.2
500	0.8
550	0.53

N.B. For all times > 550 msec., E = 0.53.

ELECTROSTATIC ANALYZER (VEHICLE IC511.21-1A)

CALIBRATION DATA

TM VOLTS	CURRENT (I) (AMPERES)
.08	2×10^{-11}
.11	5×10^{-11}
.22	1×10^{-10}
.40	2×10^{-10}
1.00	5×10^{-10}
1.23	1×10^{-9}
1.39	2×10^{-9}
1.67	5×10^{-9}
2.11	1×10^{-8}
2.40	2×10^{-8}
2.62	5×10^{-8}
2.84	1×10^{-7}
3.14	2×10^{-7}
3.60	5×10^{-7}
3.98	1×10^{-6}
4.31	2×10^{-6}
4.56	5×10^{-6}
4.72	1×10^{-5}
4.91	2×10^{-5}
5.16	5×10^{-5}

ELECTROSTATIC ANALYZER (VEHICLE IC511.21-1A)

CALIBRATION DATA

SWEEP TIME (TS) (MSEC)	ELECTRON ENERGY (E) (KEV)
10	31.5
50	24.0
100	16.5
150	12.0
200	8.4
250	5.8
300	4.0
350	2.6
400	1.6
450	1.0
500	0.5

ELECTROSTATIC ANALYZER (VEHICLE IC519.07-1B)

CALIBRATION DATA

TM VOLTS	CURRENT (I) (AMPERES)
.24	2×10^{-11}
.30	5×10^{-11}
.40	1×10^{-10}
.64	2×10^{-10}
1.12	5×10^{-10}
1.29	1×10^{-9}
1.47	2×10^{-9}
1.89	5×10^{-9}
2.26	1×10^{-8}
2.44	2×10^{-8}
2.66	5×10^{-8}
2.90	1×10^{-7}
3.30	2×10^{-7}
3.77	5×10^{-7}
3.97	1×10^{-6}
4.23	2×10^{-6}
4.84	5×10^{-6}
5.05	1×10^{-5}
5.07	2×10^{-5}

ELECTROSTATIC ANALYZER (VEHICLE IC519.07-1B)

CALIBRATION DATA

SWEEP TIME (TS) (MSEC)	ELECTRON ENERGY (E) (KEV)
5	31.0
50	19.0
75	15.0
100	12.0
125	8.4
150	6.1
175	4.6
200	3.5
225	2.5
250	1.8
275	1.2
300	0.7
325	0.4
350	0.2

For all times > 350 msec, E = 0.2

ELECTROSTATIC ANALYZER (VEHICLES IC519.07-1B, A10.312-3 & IC511.21-1A)

CALIBRATION DATA

TOTAL ELECTRON ENERGY (E + EPA) (KEV)	S^1_E	TOTAL ELECTRON ENERGY (E + EPA) (KEV)	S^1_E
2.00	2.80×10^{-5}	19.00	.754
2.25	1.00×10^{-4}	19.50	.761
2.50	3.20×10^{-4}	20.00	.768
2.75	8.80×10^{-4}	20.50	.774
3.00	2.00×10^{-3}	21.00	.779
3.25	4.20×10^{-3}	21.50	.784
3.50	7.60×10^{-3}	22.00	.789
3.75	1.25×10^{-2}	22.50	.795
4.00	1.90×10^{-2}	23.00	.800
4.25	2.50×10^{-2}	23.50	.805
4.50	3.30×10^{-2}	24.00	.810
4.75	4.20×10^{-2}	24.50	.814
5.00	5.30×10^{-2}	25.00	.818
5.25	6.60×10^{-2}	25.50	.821
5.50	8.00×10^{-2}	26.00	.825
5.75	9.60×10^{-2}	26.50	.828
6.00	.115	27.00	.831
6.50	.156	27.50	.834
7.00	.196	28.00	.837
7.50	.236	28.50	.840
8.00	.277	29.00	.843
8.50	.318	29.50	.845
9.00	.358	30.00	.848
9.50	.399	30.50	.851
10.00	.439	31.00	.855
10.50	.479	31.50	.859
11.00	.512	32.00	.863
11.50	.542	32.50	.865
12.00	.567	33.00	.867
12.50	.591	33.50	.870
13.00	.613	34.00	.872
13.50	.632	34.50	.874
14.00	.650	35.00	.876
14.50	.665	35.50	.878
15.00	.679	36.00	.880
15.50	.691	36.50	.882
16.00	.701	37.00	.884
16.50	.712	37.50	.886
17.00	.721	38.00	.888
17.50	.730	38.50	.890
18.00	.738	39.00	.892
18.50	.746	39.50	.894
		40.00	.896

ELECTROSTATIC ANALYZER (VEHICLES A18.205-1, A10.312-3 & A18.219-1)

CALIBRATION DATA

VEHICLE ALTITUDE (KILOMETER)	END POINT ENERGY (KEV)
75	1.34×10^{2}
80	8.21×10^{1}
85	4.95×10^{1}
90	3.00×10^{1}
95	1.87×10^{1}
100	1.22×10^{0}
105	8.56×10^{0}
110	6.48×10^{0}
115	5.33×10^{0}
120	4.68×10^{0}

ELECTROSTATIC ANALYZER

LIST OF CONSTANTS

Vehicle A10.312-3

$K_1 = 2.442 \times 10^{16}$

$E_L = -2.45$

Vehicle IC519.07-1B

$K_1 = 1.726 \times 10^{16}$

$E_L = -2.8$

Vehicle A18.205-1

$K_1 = 4.57 \times 10^{15}$

$E_L = 3.3$

Vehicle IC511.21-1A

$K_1 = 3.25 \times 10^{16}$

$E_L = -2.45$

Vehicle A18.219-1

$K_1 = 7.36 \times 10^{15}$

$E_L = 3.0$

LANGMUIR PROBE (VEHICLE IC511.21-1A)

CALIBRATION DATA

CURRENT (AMPERES)	POSITIVE ELECTRON (VOLTS)	CURRENT (AMPERES)	NEGATIVE ELECTRON (VOLTS)
1×10^{-10}	.99	-1×10^{-10}	1.01
3×10^{-10}	1.32	-3×10^{-10}	.70
6×10^{-10}	1.57	-6×10^{-10}	.46
3×10^{-9}	2.06	-3×10^{-9}	-.06
1×10^{-8}	2.44	-6×10^{-9}	-.30
3×10^{-8}	2.80	-1×10^{-8}	-.43
3×10^{-7}	3.51		
6×10^{-7}	3.76		
1×10^{-6}	3.90		
6×10^{-6}	4.55		
3×10^{-5}	5.13		
6×10^{-5}	5.43		

MAGNETOMETER (VEHICLE NJ74-1)

CALIBRATION DATA

FIELD (MILLIGAUSS)	OUTPUT SIGNAL (VOLTS)
600	4.78
550	4.60
500	4.40
450	4.20
400	4.01
350	3.81
300	3.60
250	3.40
200	3.20
150	3.00
100	2.80
50	2.60
0	2.40
-50	2.20
-100	2.00
-150	1.80
-200	1.60
-250	1.40
-300	1.19
-350	0.99
-400	0.79
-450	0.59
-500	0.38
-550	0.19
-600	-0.01

MAGNETOMETER (VEHICLES IC503.14-3 & IC506.14-2)

CALIBRATION DATA

FIELD (MILLIGAUSS)	OUTPUT SIGNAL (VOLTS)
600	4.79
550	4.59
500	4.39
450	4.19
400	3.99
350	3.79
300	3.59
250	3.38
200	3.18
150	2.98
100	2.79
50	2.59
0	2.39
-50	2.20
-100	2.00
-150	1.80
-200	1.60
-250	1.40
-300	1.20
-350	1.00
-400	0.79
-450	0.59
-500	0.39
-550	0.19
-600	-0.01

MAGNETOMETER (VEHICLE IC503.22-1)

CALIBRATION DATA

FIELD (MILLIGAUSS)	OUTPUT SIGNAL (VOLTS)
600	4.81
550	4.61
500	4.41
450	4.21
400	4.00
350	3.80
300	3.60
250	3.39
200	3.19
150	2.99
100	2.79
50	2.60
0	2.40
-50	2.20
-100	2.00
-150	1.80
-200	1.60
-250	1.40
-300	1.20
-350	1.00
-400	0.80
-450	0.60
-500	0.40
-550	0.20
-600	+0.01

PARTICLE COUNTER (VEHICLE A18.205-1)

COUNT RATE CALIBRATION

INPUT (COUNTS/SEC)	ELEC ≥ 4.5 KEV	ELEC ≥ 9 KEV	ELEC ≥ 17 KEV	ELEC ≥ 28 KEV	ELEC ≥ 42 KEV	ELEC ≥ 90 KEV
20	.10	.15	.17	.18	.12	.13
30	.15	.19	.23	.23	.17	.18
40	.20	.22	.27	.29	.22	.22
50	.22	.26	.33	.34	.27	.26
60	.25	.31	.38	.40	.31	.31
70	.30	.38	.43	.45	.35	.36
80	.32	.39	.48	.50	.40	.40
90	.38	.43	.53	.55	.44	.44
100	.46	.48	.58	.60	.48	.48
200	.78	.85	1.00	1.06	.90	.89
300	1.09	1.15	1.30	1.35	1.20	1.19
400	1.28	1.35	1.49	1.53	1.40	1.41
500	1.43	1.47	1.61	1.65	1.53	1.54
600	1.53	1.59	1.71	1.75	1.66	1.66
700	1.62	1.67	1.79	1.83	1.74	1.75
800	1.71	1.77	1.85	1.90	1.82	1.82
900	1.78	1.83	1.92	1.96	1.89	1.88
1000	1.82	1.89	1.98	2.02	1.95	1.94
2000	2.42	2.43	2.44	2.48	2.41	2.41
3000	2.71	2.73	2.72	2.77	2.71	2.71
4000	2.89	2.92	2.90	2.96	2.90	2.90
5000	3.01	3.04	3.02	3.09	3.03	3.03
6000	3.11	3.15	3.11	3.19	3.14	3.14
7000	3.19	3.22	3.19	3.28	3.22	3.21
8000	3.25	3.28	3.26	3.35	3.29	3.28
9000	3.31	3.34	3.31	3.41	3.35	3.34
10000	3.37	3.40	3.37	3.46	3.41	3.40
20000	3.77	3.81	3.78	3.89	3.83	3.80
30000	3.98	4.03	4.02	4.12	4.05	4.00
40000	4.10	4.15	4.15	4.25	4.17	4.09
50000	4.16	4.22	4.23	4.31	4.23	4.13

PARTICLE COUNTER (VEHICLES A18.205-1 & A10.205-2)

INPUT PARAMETERS

ENERGY RANGE (KEV)	GEOMETRIC FACTOR (cm^2-sr)
≥ 90	0.297×10^{0}
≥ 42	0.622×10^{-1}
≥ 28	0.509×10^{-2}
≥ 17	0.216×10^{-2}
≥ 9	0.448×10^{-4}
≥ 4.5	0.134×10^{-4}

$\rho_1 = \rho_2 = \rho_3 = 1.5 \times 10^{-4}$ for all KEV levels.

PARTICLE COUNTER (VEHICLE A18.219-1)

COUNT RATE CALIBRATION

INPUT (COUNTS/SEC)	ELEC ≥ 4.5 KEV	INPUT (COUNTS/SEC)	ELEC ≥ 9 KEV	INPUT (COUNTS/SEC)	ELEC ≥ 17 KEV
10	.15	10	.14	10	.17
20	.18	17	.14	20	.19
32	.21	25	.17	40	.28
52	.30	40	.20	50	.30
80	.43	63	.32	80	.45
109	.59	100	.47	100	.54
150	.78	155	.70	150	.78
330	1.35	250	1.05	200	.97
425	1.50	335	1.21	250	1.18
510	1.61	500	1.51	300	1.25
700	1.80	690	1.75	500	1.59
999	1.98	1000	1.95	1000	1.93
1330	2.13	1300	2.10	2000	2.40
2050	2.42	4600	3.00	2500	2.55
4000	2.91	7000	3.19	3000	2.67
5000	3.05	9100	3.32	7000	3.14
14000	3.60	15000	3.60	14000	3.50
18000	3.75	16000	3.65	20000	3.73
22500	3.90	18000	3.70	25000	3.89
26000	4.00	20000	3.75	32000	3.99
30000	4.05	25000	3.86	38000	4.02
40000	4.12	30000	3.93	50000	4.08
50000	4.16	34000	3.99		
		50000	4.09		

PARTICLE COUNTER (VEHICLE A18.219-1)

COUNT RATE CALIBRATION (CONT.)

INPUT (COUNTS/SEC)	ELEC ≥ 23	INPUT (COUNTS/SEC)	ELEC ≥ 42 KEV	INPUT (COUNTS/SEC)	ELEC ≥ 90 KEV
10	.12	10	.20	12	.15
21	.18	19	.20	21	.17
45	.25	35	.25	33	.20
75	.37	50	.30	67	.30
102	.50	68	.38	78	.38
130	.62	100	.50	110	.50
200	.89	150	.71	138	.60
500	1.55	238	1.03	165	.70
720	1.78	300	1.21	200	.88
900	1.90	400	1.40	250	1.10
1970	2.43	610	1.68	470	1.50
3000	2.73	850	1.80	998	1.89
5000	3.08	998	1.93	1120	1.98
16000	3.74	1300	2.26	1220	2.04
20000	3.83	1600	2.40	1500	2.30
30000	4.04	2000	2.50	1700	2.39
40000	4.19	2500	2.58	2500	2.53
50000	4.23	3000	2.62	3800	2.80
		4100	2.85	5200	3.00
		30000	3.99	13000	3.50
		36000	4.03	25500	3.90
		40500	4.07	30000	3.96
		50000	4.10	34000	3.99
				50000	4.00

PARTICLE COUNTER (VEHICLE A18.219-1)

INPUT PARAMETERS

ENERGY RANGE (KEV)	GEOMETRIC FACTOR (cm^2-sr)	ρ_1	ρ_2	ρ_3
≥ 90	0.296	100×10^{-6}	200×10^{-6}	400×10^{-6}
≥ 42	0.622×10^{-1}	100×10^{-6}	200×10^{-6}	400×10^{-6}
≥ 28	0.509×10^{-2}	75×10^{-6}	150×10^{-6}	300×10^{-6}
≥ 17	0.216×10^{-2}	75×10^{-6}	150×10^{-6}	300×10^{-6}
≥ 9	0.112×10^{-4}	0	0	0
≥ 4.5	0.335×10^{-5}	0	0	0

PARTICLE COUNTER (VEHICLE A10.312-3)

COUNT RATE CALIBRATION

INPUT (COUNTS/SEC)	ELEC ≥ 4.5 KEV	ELEC ≥ 9 KEV	ELEC ≥ 17 KEV	ELEC ≥ 28 KEV	ELEC ≥ 42 KEV	ELEC ≥ 90 KEV
0	.04	.09	.06	.10	.08	.05
50	.29	.32	.33	.37	.35	.33
75	.44	.47	.50	.53	.52	.51
100	.58	.62	.67	.70	.68	.68
150	.81	.85	.92	.94	.93	.94
200	1.05	1.08	1.15	1.17	1.16	1.18
250	1.25	1.27	1.33	1.35	1.34	1.37
300	1.44	1.45	1.50	1.51	1.50	1.54
400	1.68	1.67	1.70	1.70	1.69	1.74
500	1.87	1.85	1.85	1.85	1.83	1.90
700	2.12	2.07	2.85	2.04	2.02	2.10
1000	2.37	2.30	2.26	2.25	2.22	2.32
1300	2.58	2.49	2.43	2.42	2.39	2.50
1600	2.76	2.66	2.60	2.58	2.55	2.67
2000	2.96	2.85	2.78	2.76	2.73	2.85
2500	3.16	3.04	2.97	2.95	2.91	3.04
3000	3.32	3.19	3.13	3.10	3.06	3.19
4000	3.54	3.41	3.55	3.32	3.27	3.41
5000	3.69	3.55	3.50	3.47	3.41	3.56
7000	3.89	3.75	3.71	3.68	3.61	3.77
9000	4.05	3.90	3.87	3.83	3.76	3.91
10000	4.11	3.96	3.94	3.90	3.82	3.98
12000	4.23	4.07	4.06	4.02	3.93	4.10
14000	4.34	4.17	4.17	4.12	4.03	4.20
16000	4.44	4.27	4.26	4.21	4.12	4.29
18000	4.53	4.36	4.36	4.31	4.21	4.38
20000	4.60	4.43	4.44	4.39	4.28	4.45
25000	4.75	4.58	4.60	4.54	4.44	4.62
30000	4.86	4.70	4.74	4.67	4.56	4.72
50000	5.00	4.91	4.98	4.93	4.81	4.95

PARTICLE COUNTER (VEHICLE A10.312-3)

INPUT PARAMETERS

ENERGY RANGE (KEV)	GEOMETRIC FACTOR (cm^2-sr)	ρ_1	ρ_2	ρ_3
≥ 90	0.296	100×10^{-6}	200×10^{-6}	400×10^{-4}
≥ 42	0.622×10^{-1}	100×10^{-6}	200×10^{-6}	400×10^{-4}
≥ 28	0.509×10^{-2}	75×10^{-6}	150×10^{-6}	300×10^{-4}
≥ 17	0.216×10^{-2}	75×10^{-6}	150×10^{-6}	300×10^{-4}
≥ 9	0.112×10^{-4}	0	0	0
≥ 4.5	0.335×10^{-5}	0	0	0

PARTICLE COUNTER (VEHICLE IC511.21-1A)

COUNT RATE CALIBRATION

Output (Volts)

INPUT (COUNTS/SEC)	ELEC ≥ 4.5 KEV	ELEC ≥ 9 KEV	ELEC ≥ 17 KEV	ELEC ≥ 28 KEV	ELEC ≥ 42 KEV	ELEC ≥ 90 KEV
1	.0	.0	.0	.0	.0	.0
25	.29	.25	.26	.26	.23	.30
50	.43	.37	.42	.40	.37	.37
75	.56	.52	.64	.53	.52	.52
100	.69	.65	.77	.67	.66	.67
150	.94	.91	1.03	.91	.95	.97
200	1.18	1.16	1.37	1.16	1.20	1.22
250	1.37	1.37	1.52	1.35	1.39	1.43
300	1.53	1.54	1.69	1.50	1.61	1.60
350	1.65	1.68	1.81	1.61	1.76	1.75
400	1.76	1.78	1.90	1.72	1.87	1.88
500	1.92	1.97	2.02	1.86	2.05	2.06
600	2.04	2.10	2.13	1.99	2.18	2.21
700	2.14	2.21	2.26	2.09	2.29	2.31
800	2.23	2.30	2.36	2.17	2.38	2.40
1000	2.40	2.46	2.50	2.32	2.55	2.57
1100	2.46	2.54	2.58	2.39	2.62	2.67
1300	2.59	2.67	2.72	2.51	2.78	2.79
1500	2.71	2.79	2.85	2.62	2.89	2.93
2000	2.96	3.05	2.05	2.87	3.16	3.24
2500	3.15	3.26	3.21	3.06	3.37	3.39
3000	3.29	3.42	3.41	3.21	3.53	3.52
4000	3.50	3.64	3.60	3.44	3.78	3.73
5000	3.64	3.80	3.71	3.58	3.94	3.86
7000	3.85	4.01	3.90	3.79	4.19	4.05
9000	3.99	4.17	4.06	3.96	4.33	4.24
12000	4.18	4.36	4.25	4.15	4.52	4.47
15000	4.34	4.52	4.42	4.31	4.68	4.64
18000	4.48	4.66	4.55	4.45	4.73	4.74
20000	4.55	4.74	4.63	4.52	4.84	4.79
25000	4.71	4.90	4.81	4.68	5.02	4.95
30000	4.82	5.02	4.92	4.79	5.13	5.06
35000	4.90	5.11	4.98	4.88	5.19	5.13
40000	4.96	5.17	5.04	4.94	5.23	5.23
45000	5.00	5.22	5.09	4.99	5.28	5.28
50000	5.02	5.25	5.14	5.02	5.33	5.30

PARTICLE COUNTER (VEHICLE IC519.07-1B)

COUNT RATE CALIBRATION

OUTPUT (VOLTS)

INPUT (COUNTS/SEC)	ELEC > 4.5 KEV	ELEC > 9 KEV	ELEC > 17 KEV	ELEC > 28 KEV	ELEC > 42 KEV	ELEC > 90 KEV
1	.0	.0	.0	.0	.0	.0
25	.29	.25	.23	.24	.21	.23
50	.42	.39	.39	.36	.35	.39
75	.55	.55	.54	.50	.50	.54
100	.68	.68	.69	.64	.65	.70
150	.94	.97	.97	.87	.94	.98
200	1.17	1.23	1.23	1.10	1.18	1.24
250	1.37	1.43	1.44	1.21	1.37	1.44
300	1.54	1.58	1.60	1.51	1.54	1.61
350	1.67	1.70	1.73	1.63	1.65	1.73
400	1.80	1.80	1.85	1.74	1.76	1.83
500	1.97	1.97	2.02	1.93	1.91	1.99
600	2.10	2.09	2.15	2.07	2.03	2.12
700	2.22	2.19	2.25	2.18	2.13	2.23
800	2.32	2.28	2.35	2.27	2.22	2.32
1000	2.48	2.45	2.52	2.44	2.37	2.48
1100	2.56	2.52	2.59	2.51	2.44	2.56
1300	2.70	2.65	2.73	2.65	2.57	2.70
1500	2.82	2.77	2.86	2.77	2.69	2.81
2000	3.08	3.03	3.12	3.03	2.94	3.07
2500	3.27	3.23	3.33	3.23	3.14	3.27
3000	3.43	3.38	3.48	3.39	3.29	3.43
4000	3.65	3.60	3.69	3.61	3.51	3.64
5000	3.80	3.74	3.85	3.77	3.66	3.79
7000	4.00	3.95	4.06	3.99	3.87	3.99
9000	4.15	4.11	4.22	4.15	4.03	4.15
12000	4.35	4.31	4.42	4.35	4.22	4.34
15000	4.50	4.46	4.59	4.51	4.39	4.51
18000	4.64	4.61	4.72	4.65	4.52	4.65
20000	4.72	4.70	4.81	4.73	4.60	4.72
25000	4.88	4.87	4.97	4.91	4.76	4.88
30000	4.99	4.99	5.09	5.04	4.87	5.00
35000	5.07	5.08	5.16	5.13	4.94	5.07
40000	5.14	5.15	5.24	5.20	4.99	5.13
45000	5.18	5.20	5.29	5.25	5.03	5.16
50000	5.21	5.24	5.31	5.31	5.06	5.19

PARTICLE COUNTER (VEHICLES IC511.21-1A & IC519.07-1B)

INPUT PARAMETERS

ENERGY RANGE (KEV)	GEOMETRIC FACTOR (cm^2-sr)
≥ 4.5	$.416 \times 10^{-5}$
≥ 9	$.136 \times 10^{-4}$
≥ 17	$.216 \times 10^{-2}$
≥ 28	$.509 \times 10^{-2}$
≥ 42	$.622 \times 10^{-1}$
≥ 90	.296

RADIOMETERS & PHOTOMETERS

CALIBRATION EQUATIONS

VEHICLE	LINK	SUBCARRIER	CALIBRATION EQUATIONS
A18.219-1	1	6	$KR=2.9V-0.23$ for $V \leq 2.75$
			$KR=33.33V-83.67$ for $V > 2.75$
		7	$MR=146.9V-580.1$ for $3.9689 < V \leq 4.25$
			$MR=0.663V+0.154$ for $0 \leq V \leq 3.9689$
		10	$MR=2.2V-0.133$ for $0.06 \leq V \leq 2.78$
			$MR=22.8V-57.4$ for $2.78 < V < 5.0$
		12	$MR=2.19V-0.044$ for $0.02 \leq V \leq 2.7387$
			$MR=21.3V-52.3$ for $2.7387 \leq V \leq 5.0$
	2	8	$KR=0.75V$ for $V \leq 2.63$
			$KR=8.75V-20.91$ for $V > 2.63$
		9	$KR=17.19V-258$ for $V \leq 2.68$
			$KR=188.24V-462.48$ for $V > 2.68$
		10	$KR=23.5V+0.47$ for $V \leq 2.67$
			$KR=245.49V-592.46$ for $V > 2.67$
		11	$KR=0.215V$ for $V \leq 2.7$
			$KR=2.279V-5.613$ for $V > 2.7$
		12	$KR=0.32V-0.06$ for $V \leq 2.75$
			$KR=3.42V-8.56$ for $V > 2.75$

where V is TM voltage, corrected for in-flight calibrations.

RADIOMETERS & PHOTOMETERS

CALIBRATION EQUATIONS (Cont.)

VEHICLE	LINK	SUBCARRIER	CALIBRATION EQUATIONS
A18.006-2	2	6	$KR=(78.2V-2.35) \times 10^{-3}$ for $V \leq 2.42$ $KR=1.73V-4.0$ for $2.42 < V \leq 5.0$
A18.006-4	2	6	$KR=(75.6V-8.32) \times 10^{-3}$ for $V \leq 2.47$ $KR=1.37V-3.197$ for $2.47 < V \leq 5.0$
A10.312-3	1	6	$KR=1.715V$ for $V < 2.74$ $KR=19.68V-49.12$ for $V \geq 2.74$
A18.205-1	1	6	$KR=2.8365V$ for $V < 2.6$ $KR=27.2729V-63.5346$ for $V \geq 2.6$
IC511.21-1A	1	5	$KR=1.964V-0.08$ for $V \leq 2.75$ $KR=20.0V$ for $V > 2.75$
IC503.14-3	1	12	$KR=780V-71.8$
		13	$KR=2200V-165.0$
		15	$KR=80V-7.2$
		16	$KR=220V-9.7$
IC506.14-2	1	12	$KR=490V-55.9$
		13	$KR=740V-62.9$
		15	$KR=49V-5.5$
		16	$KR=72V-9.9$
EX531.43-1	1	6	$MR=2.28V-0.136$ for $V \leq 2.78$ $MR=23.6V-59.43$ for $V > 2.78$
		7	$MR=1.1V$
		8	$MR=2.36V + 0.07$ for $V \leq 2.83$ $MR=26.38V-67.89$ for $V > 2.83$
		9	$MR=11V$
		12	$KR=62.5V + 0.63$ for $V \leq 2.8$ $KR=693.18V-1765.9$ for $V > 2.8$

where V is TM voltage data, corrected for in-flight calibrations.

RADIOMETERS & PHOTOMETERS

CALIBRATION EQUATIONS (Cont.)

VEHICLE	LINK	SUBCARRIER	CALIBRATION EQUATIONS
A30.311-7	1	13	KR=0
		14	KR=0
		15	KR=30.3V
		16	KR=29.7V
A30.311-8	1	13	KR=0
		14	KR=136.0V
		15	KR=0
		16	KR=0
A30.205-7	1	13	KR=307.0V
		14	KR=279.0V
		15	KR=30.7V
		16	KR=27.3V-4.59

where V is TM voltage data, corrected for in-flight calibrations.

RADIOMETERS & PHOTOMETERS

CALIBRATION EQUATIONS (Cont.)

VEHICLE	LINK	SUBCARRIER	CALIBRATION EQUATIONS
IC507.11-1A	1	5	MR=0.6051V
		6	MR=0.6051 x 10.0V
		7	MR=0.6051 x 67.0V
		8	MR=0.6051 x 500.0V
		9	MR=0.3507V
		10	MR=0.3507 x 12.0V
		11	MR=0.3507 x 120.0V
		12	MR=0.3507 x 1200.0V
		13	MR=0.5418V
		15	MR=0.5418 x 10.0V
		16	MR=0.5418 x 109.0V
		17	MR=0.5418 x 1174.0V
IC507.11-2A		5	MR=0.1276V
		6	MR=0.1276 x 13.3V
		7	MR=0.1276 x 171V
		8	MR=0.1276 x 2238V
		9	MR=0.2981V
		10	MR=0.2981 x 11.3V
		11	MR=0.2981 x 133.0V
		12	MR=0.2981 x 1294.0V
		13	$B=8.8 \times 10^{-11}V$
		15	$B=8.8 \times 10^{-11} \times 11.14V$
		16	$B=8.8 \times 10^{-11} \times 136.4V$
		17	$B=8.8 \times 10^{-11} \times 1648.0V$

where V is TM voltage data, corrected for in-flight calibrations and B is in units of watts-cm^{-2}-str^{-1}.

RADIOMETERS & PHOTOMETERS

CALIBRATION EQUATIONS (Cont.)

VEHICLE	LINK	SUBCARRIER	CALIBRATION EQUATIONS
IC507.11-3	1	5	MR=1.0893V
		6	MR=10893 x 10.6V
		7	MR=1.0893 x 100V
		8	MR=1.0893 x 1000V
		9	MR=0.3858V
		10	MR=0.3858 x 10V
		11	MR=0.3858 x 100V
		12	MR=0.3858 x 1000V
		13	MR=0.2709V
		15	MR=0.2709 x 10V
		16	MR=0.2709 x 100V
		17	MR=0.2709 x 1000V

where V is TM voltage data, corrected for in-flight calibrations.

RADIOMETERS & PHOTOMETERS

CALIBRATION EQUATIONS (Cont.)

VEHICLE	LINK	SUBCARRIER	CALIBRATION EQUATIONS
IC519.07-1B	1	6	$KR=3.181V-0.159$ for $V \leq 2.76$
			$KR=32.1V-79.977$ for $V > 2.76$
		7	$KR=259.0V-12.5$ for $V < 2.91$
			$KR=3220.0V-8626.0$ for $V \geq 2.91$
		9	$KR=227.0V-34.05$ for $V < 2.94$
			$KR=2620.0V-7068.75$ for $V \geq 2.94$
	2	9	$KR=14.511V-0.290$ for $V \leq 2.68$
			$KR=142.845V-344.225$ for $V > 72.68$
		10	$KR=21.852V + 0.656$ for $V \leq 2.67$
			$KR=232.189V-560.945$ for $V > 72.67$
		11	$B=22.18V-2.22$
		12	$B=443.6V-1.77$

where V is TM voltage data, corrected for in-flight calibrations.

RADIOMETERS & PHOTOMETERS

CALIBRATION EQUATIONS (Cont.)

Vehicle EX630.42-1

LINK	IRIG	M_1(KR/V)	R_1(KR)	V_k(Volts)	M_2(KR/V)	R_2(KR)
	GROUP I					
2	13					
3	8	1.718×10^3	$.067\times10^3$	2.746	19.724×10^3	-49.408×10^3
2	4	90.090	3.604	2.792	980.392	-2480.392
2	6	2.747	.137	2.777	28.571	-71.571
2	8	4.629	-.130	2.802	46.729	-118.505
	GROUP II					
2	13					
2	5	9.259	.389	2.748	97.087	-240.583
2	7	.746	.031	2.760	7.874	-19.638
3	5	.369	.021	2.750	3.937	-9.803
3	6	.124	.044	2.846	1.389	-3.555
	GROUP III					
2	13					
3	7	8.130	4.959	2.759	83.333	-202.5
3	9	48.309	4.831	2.745	543.478	-1357.609
2	9	5.376×10^{-3}	$-.086\times10^{-3}$	2.721	49.751×10^{-3}	-120.896×10^{-3}
	GROUP IV					
2	13					
1	5	2.32	-.0232	2.681	15.2	-34.5
1	6	122.0	24.4	2.797	1.39×10^3	-3.54×10^3
1	7	146.0	-2.92	2.791	1.46×10^3	-3.66×10^3
1	8	76.7	-2.30	2.878	6.94×10^2	-1.78×10^3
	GROUP V					
2	13					
1	9	3.12×10^3	1.56×10^2	2.796	3.15×10^4	-7.92×10^4
1	10	3.93×10^2	1.18×10^2	2.954	4.35×10^3	-1.17×10^4

where $KR=M_1V+R$ for $V \leq V_k$

$KR=M_2V+R_2$ for $V > V_k$

and $KV=1.217V$ for Link 2, subcarrier 13.

RADIOMETERS & PHOTOMETERS

CALIBRATION EQUATIONS (Cont.)

Vehicle EX630.42-1

LINK	IRIG	M_1(KR/V)	R_1(KR)	V_k(Volts)	M_2(KR/V)	R_2(KR)
	GROUP VI					
2	13					
3	19	2.075×10^3	$.106\times10^3$	2.786	22.222×10^3	-56.0×10^3
2	17	90.909	5.455	2.706	1010.10	-2478.788
2	11	2.809	.112	2.732	30.488	-75.457
2	15	4.292	.150	2.713	43.860	-107.018
	GROUP VII					
2	13					
2	18	8.929	.017	2.700	95.238	-233.333
2	12	.752	.033	2.782	7.752	-19.442
3	16	.372	.026	2.754	4.237	-10.619
3	17	.118	.031	2.768	1.414	-3.559
	GROUP VIII					
2	13					
3	18	5.555×10^{-3}	-2.167×10^{-3}	2.758	82.645×10^{-3}	-214.876×10^{-3}
2	10	48.544	4.854	2.767	520.833	-1302.083
2	16	7.63×10^{-3}	0.00	2.729	76.923×10^{-3}	-189.231×10^{-3}
	GROUP IX					
2	13					
1	13	1.26×10^3	2.52×10^1	2.974	1.48×10^4	-4.03×10^4
1	15	7.89×10^2	1.58×10^1	2.876	7.94×10^3	-2.06×10^4
1	11	7.95×10^2	6.36×10^1	2.858	9.12×10^3	-2.38×10^4
1	12	5.11×10^2	8.69×10^1	2.779	5.96×10^3	-1.52×10^4
	GROUP X					
2	13					
1	16	6.27×10^2	1.25×10^1	2.762	7.48×10^3	-1.89×10^4
1	17	4.93×10^2	0.00	2.932	5.50×10^3	-1.47×10^4

where $KR=M_1V+R$ for $V \le V_k$

$KR=M_2V+R_2$ for $V > V_k$

and KV=1.217V for Link 2, subcarrier 13.

RETARDING POTENTIAL ANALYZER (VEHICLE A18.219-1)

CALIBRATION DATA

TELEMETRY VOLTAGE	ELECTRON CURRENT
.15	5×10^{-12}
.38	1×10^{-11}
.92	5×10^{-11}
1.17	1×10^{-10}
1.72	5×10^{-10}
1.96	1×10^{-9}
2.50	5×10^{-9}
2.74	1×10^{-8}
3.25	5×10^{-8}
3.48	1×10^{-7}
4.03	5×10^{-7}
4.28	1×10^{-6}
4.83	5×10^{-6}
5.06	1×10^{-5}

RETARDING POTENTIAL ANALYZER (VEHICLE A18.219-1)

CALIBRATION DATA

TELEMETRY VOLTAGE	ION CURRENT
4.72	5×10^{-12}
4.40	1×10^{-11}
3.63	5×10^{-11}
3.30	1×10^{-10}
2.54	5×10^{-10}
2.21	1×10^{-9}
1.42	5×10^{-9}
1.07	1×10^{-8}
.29	5×10^{-8}
-.05	1×10^{-7}

SOFT ELECTRON SPECTROMETER (VEHICLE IC511.21-1A)

CALIBRATION DATA

COUNTS/SEC.	TM VOLTS	COUNTS/SEC.	TM VOLTS
20	.13	3600	3.00
50	.17	3800	3.08
100	.23	4000	3.16
200	.34	4200	3.24
300	.46	4400	3.30
400	.58	4600	3.37
500	.69	4800	3.44
600	.81	5000	3.49
700	.93	5500	3.64
800	1.03	6000	3.77
900	1.14	6500	3.88
1000	1.25	7000	4.00
1200	1.47	7500	4.10
1400	1.65	8000	4.18
1600	1.83	9000	4.35
1800	1.99	10000	4.50
2000	2.14	11k	4.62
2200	2.29	12k	4.73
2400	2.41	13k	4.82
2600	2.53	14k	4.91
2800	2.63	15k	4.99
3000	2.73	16k	5.06
3200	2.83	17k	5.09 SAT
3400	2.92		

SOFT ELECTRON SPECTROMETER (VEHICLE IC511.21-1A)

LIST OF CONSTANTS

ξ_{max} = 1500 eV (sweep calibration)

ξ_{min} = 100 ev (sweep calibration)

t = 0.40 (energy resolution)

K = 1.22 (reciprocal transparency)

Ω = 1.08×10^{-3} (geometric factor-cm^2/ster)

k = 2.708

SWIR CVF SPECTROMETER (VEHICLE A10.205-2)

CALIBRATION DATA

SHORT WAVELENGTH FILTER

λ (μm)	C_λ (MR/μm Volt)
1.50	29.3
1.75	22.0
2.00	17.6
2.25	14.7
2.50	13.8
2.75	13.5

SWIR CVF SPECTROMETER (VEHICLE A10.205-2)

CALIBRATION DATA

LONG WAVELENGTH FILTER

λ (μm)	C_λ (MR/μm Volt)
2.75	22.1
3.00	26.4
3.25	26.1
3.50	21.3
3.75	18.4
4.00	16.4
4.25	14.7
4.50	14.3
4.75	15.0
5.00	17.6
5.25	22.6

LIST OF CONSTANTS

$M_s = -2.5075$

$M_\ell = -5.7239$

$K_s = 4.0735$

$K_\ell = 5.566$

$P_o = 0.48$

$K_o = 0$

$\Delta t_p = .01$ seconds

$G = 1$ for the high gain channel

$G = 10$ for the low gain channel

$\chi = 1$

$C_p = .001$ seconds

$a = 2$

SWIR CVF SPECTROMETER (VEHICLE A18.205-1)

CALIBRATION DATA

SHORT WAVELENGTH FILTER

λ (μm)	C_λ (MR/μm Volt)
1.50	22.8
1.75	18.6
2.00	14.2
2.25	10.4
2.50	9.16
2.75	9.75

SWIR CVF SPECTROMETER (VEHICLE A18.205-1)

CALIBRATION DATA

LONG WAVELENGTH FILTER

λ (μm)	C_λ (MR/μm Volt)
2.75	20.9
3.00	20.0
3.25	20.3
3.50	18.6
3.75	16.6
4.00	14.2
4.25	12.9
4.50	11.7
4.75	11.0
5.00	11.1
5.25	11.3

SWIR CVF SPECTROMETER (VEHICLE A18.205-1)

LIST OF CONSTANTS

$M_s = 2.7485$

$M_\ell = 5.6202$

$K_s = 1.4958$

$K_\ell = -0.0090$

$P_o = 0.48$

$K_o = 0$

$\Delta t_p = 0.010$ seconds

$G = 1$ for the high gain channel

$G = 10$ for the low gain channel

$\chi = 1$

$C_p = .001$ seconds

$a = 2$

SWIR CVF SPECTROMETER (VEHICLE NJ-74-1)

CALIBRATION DATA

SHORT WAVELENGTH FILTER

λ (μm)	C_λ (MR/μm Volt)
1.696	4.6
1.863	6.3
1.969	5.7
2.136	4.3
2.236	3.7
2.408	3.2
2.524	3.2
2.692	3.0

SWIR CVF SPECTROMETER (VEHICLE NJ-74-1)

CALIBRATION DATA

LONG WAVELENGTH FILTER

λ (μm)	C_λ (MR/μm Volt)
2.995	6.3
3.211	6.8
3.552	6.1
3.768	5.6
4.121	4.6
4.337	4.4
4.678	3.7
4.883	3.6
5.213	3.7
5.450	5.0

SWIR CVF SPECTROMETER (VEHICLE NJ-74-1)

LIST OF CONSTANTS

$M_s = 2.7485$

$M_\ell = 5.6202$

$K_s = 1.4958$

$K_\ell = -0.0090$

$P_o = 0.48$

$K_o = 0$

$\Delta t_p = 0.01$ seconds

$G = 1$ for the high gain channel

$G = 10$ for the low gain channel

$\chi = 1$

$C_p = .001$ seconds

$a = 2$

SWIR CVF SPECTROMETER (VEHICLE A18.219-1)

CALIBRATION DATA

SHORT WAVELENGTH FILTER

λ (μm)	C_λ (MR/μm Volt)	λ (μm)	C_λ (MR/μm Volt)
1.84	5.09	2.56	3.04
1.88	4.92	2.60	3.13
1.92	4.79	2.64	3.25
1.96	4.58	2.68	3.44
2.00	4.41	2.72	3.78
2.04	4.26	2.76	4.31
2.08	4.10	2.80	4.61
2.12	3.95	2.84	4.76
2.16	3.79	2.88	4.88
2.20	3.65	2.92	4.97
2.24	3.53	2.96	5.04
2.28	3.39	3.00	5.09
2.32	3.31	3.04	5.05
2.36	3.21	3.08	4.95
2.40	3.09	3.12	4.79
2.44	3.00	3.16	4.51
2.48	2.98	3.20	4.25
2.52	2.98		

SWIR CVF SPECTROMETER (VEHICLE A18.219-1)

CALIBRATION DATA

LONG WAVELENGTH FILTER

λ (µm)	C_λ (MR/µm Volt)	λ (µm)	C_λ (MR/µm Volt)
3.25	2.49	4.80	2.25
3.30	2.50	4.90	2.30
3.40	2.52	5.00	2.36
3.50	2.53	5.10	2.45
3.60	2.49	5.20	2.57
3.70	2.47	5.24	2.63
3.80	2.45	5.28	2.72
3.90	2.40	5.32	2.78
4.00	2.35	5.36	2.90
4.10	2.34	5.40	3.06
4.20	2.34	5.44	3.35
4.30	2.29	5.48	3.66
4.40	2.23	5.52	4.07
4.50	2.21	5.56	4.78
4.60	2.21	5.60	6.40
4.70	2.22		

SWIR CVF SPECTROMETER (VEHICLE A18.219-1)

LIST OF CONSTANTS

$M_s = -3.42$

$M_\ell = -6.168$

$K_s = 5.12$

$K_\ell = 6.19$

$P_o = 0.52$

$K_o = 0$

$\Delta t_p = .01$ seconds

$G = 1$ for the high gain channel

$G = 10$ for the low gain channel

$\chi = 1$

$C_p = .001$ seconds

$a = 2$

SWIR CVF SPECTROMETER (VEHICLE IC519.07-1B)

CALIBRATION DATA

SHORT WAVELENGTH FILTER

λ (μm)	C_λ (MR/μm Volt)
1.80	9.99
1.84	9.86
1.88	9.36
1.92	9.00
1.96	8.86
1.98	8.95
2.00	6.02
2.04	5.89
2.08	5.77
2.12	5.61
2.16	5.42
2.20	5.27
2.24	5.12
2.28	4.98
2.32	4.88
2.36	4.71
2.40	4.57
2.44	4.51
2.48	4.44
2.52	4.43
2.56	4.50
2.60	4.51
2.64	4.50
2.68	4.57
2.72	4.65
2.76	4.73
2.80	4.88
2.84	5.13
2.88	5.33
2.92	5.48
2.96	5.56
3.00	5.60
3.03	5.57

SWIR CVF SPECTROMETER (VEHICLE IC519.07-1B)

CALIBRATION DATA

LONG WAVELENGTH DATA

λ (μm)	C_λ (MR/μm/Volt)
3.04	4.69
3.08	4.62
3.12	4.51
3.16	4.39
3.20	4.29
3.30	4.07
3.40	3.91
3.50	3.82
3.60	3.69
3.70	3.61
3.80	3.53
3.90	3.45
4.00	3.42
4.10	3.40
4.20	3.36
4.30	3.32
4.40	3.28
4.50	3.24
4.60	3.20
4.70	3.15
4.80	3.12
4.90	3.16
5.00	3.23
5.12	3.41
5.16	3.58
5.20	3.68
5.24	3.81
5.28	3.98
5.32	4.20
5.36	4.52
5.40	5.06
5.44	5.88
5.48	7.65
5.52	10.60
5.56	15.60
5.60	22.90
5.64	35.90

SWIR CVF SPECTROMETER (VEHICLE IC519.07-1B)

LIST OF CONSTANTS

$M_s = 3.2374$

$M_\ell = 6.1280$

$K_s = 1.580$

$K_\ell = -0.240$

$P_o = 0.51$

$K_o = 0$

$\Delta t_p = 0.01$ seconds

$G = 1$ for the high gain channel

$G = 10.66$ for the low gain channel

$X = 1$

$C_p = 0.001$ seconds

$a = 2$

$\Delta\lambda = 0.033 + 0.01413X\lambda$ for $1.80\ \mu m \leq \lambda \leq 3.03\mu m$

$\Delta\lambda = 0.0545 + 0.01506X\lambda$ for $3.04\mu m \leq \lambda \leq 5.64\mu m$.

LWIR CVF SPECTROMETER (VEHICLE A18.006-2)

CALIBRATION DATA

SHORT WAVELENGTH FILTER

λ (μm)	C_λ (MR/μm Volt)	λ (μm)	C_λ (MR/μm Volt)
7.0	1.010	9.8	0.662
7.1	0.964	9.9	0.653
7.2	0.929	10.0	0.653
7.3	0.885	10.1	0.654
7.4	0.846	10.2	0.654
7.5	0.811	10.3	0.647
7.6	0.774	10.4	0.631
7.7	0.760	10.5	0.627
7.8	0.740	10.6	0.626
7.9	0.735	10.7	0.625
8.0	0.734	10.8	0.624
8.1	0.728	10.9	0.629
8.2	0.721	11.0	0.639
8.3	0.709	11.1	0.656
8.4	0.691	11.2	0.672
8.5	0.684	11.3	0.685
8.6	0.675	11.4	0.691
8.7	0.667	11.5	0.690
8.8	0.652	11.6	0.695
8.9	0.643	11.7	0.676
9.0	0.637	11.8	0.667
9.1	0.640	11.9	0.658
9.2	0.642	12.0	0.648
9.3	0.649	12.05	0.647
9.4	0.650	12.10	0.661
9.45	0.671	12.15	0.683
9.5	0.704	12.20	0.705
9.55	0.744	12.25	0.712
9.6	0.736	12.30	0.676
9.65	0.697	12.40	0.686
9.7	0.677		

LWIR CVF SPECTROMETER (VEHICLE A18.006-2)

CALIBRATION DATA

LONG WAVELENGTH FILTER

λ (μm)	C_λ (MR/ m Volt)	λ (μm)	C_λ (MR/μm Volt)
12.9	0.186	18.0	0.202
13.0	0.191	18.2	0.202
13.2	0.202	18.4	0.202
13.4	0.215	18.6	0.206
13.6	0.226	18.8	0.208
13.8	0.235	19.0	0.209
14.0	0.233	19.2	0.220
14.2	0.228	19.4	0.234
14.4	0.225	19.6	0.249
14.6	0.223	19.8	0.253
14.8	0.222	20.0	0.251
15.0	0.221	20.2	0.240
15.2	0.221	20.4	0.226
15.4	0.219	20.6	0.216
15.6	0.218	20.8	0.214
15.8	0.218	21.0	0.218
16.0	0.218	21.2	0.224
16.2	0.218	21.4	0.230
16.4	0.217	21.6	0.236
16.6	0.214	21.8	0.242
16.8	0.206	22.0	0.253
17.0	0.201	22.2	0.264
17.2	0.197	22.4	0.273
17.4	0.192	22.6	0.275
17.6	0.194	22.8	0.315
17.8	0.198	23.0	0.335

LWIR (CVF) SPECTROMETER (VEHICLE A18.006-2)

LIST OF CONSTANTS

M_s = 12.7

M_ℓ = 25.59

K_s = 6.42

K_ℓ = -0.62

P_o = 0.5

K_o = 0

Δt_p = 5 milliseconds

G = 1 for channel 16

G = 10 for channel 15

G = 100 for channel 14

G = 1640 for channel 13 for $V \leq 1.5$,
where V = TM voltage data corrected for in-flig[illegible] calibrations

G = 1500 for channel 13 for $V > 1.5$

X = 1 for channels 16 and 15

X = 1 for channel 14 when $V \leq 1$

X = 1.22 for channel 14 when $V > 1$

X = 1.22 for channel 13 when $V \leq 1.5$

X = 1.37 for channel 13 when $V > 1.5$

C_p = 1 millisecond

$a = \infty \rightarrow N_1 = 0$

LWIR CVF SPECTROMETER (VEHICLE A18.006-4)

CALIBRATION DATA

SHORT WAVELENGTH FILTER

λ (μm)	C_λ (MR/μm Volt)	λ (μm)	C_λ (MR/μm Volt)
7.0	1.25	10.0	1.12
7.1	1.28	10.1	1.10
7.2	1.22	10.2	1.07
7.3	1.18	10.3	1.05
7.4	1.15	10.4	1.04
7.5	1.14	10.5	1.03
7.6	1.14	10.6	1.02
7.7	1.14	10.7	1.02
7.8	1.15	10.8	1.04
7.9	1.17	10.9	1.08
8.0	1.22	11.0	1.10
8.1	1.28	11.1	1.12
8.2	1.31	11.2	1.12
8.3	1.31	11.3	1.12
8.4	1.32	11.4	1.11
8.5	1.32	11.5	1.10
8.6	1.31	11.6	1.08
8.7	1.31	11.7	1.05
8.8	1.28	11.8	1.04
8.9	1.28	11.9	1.03
9.0	1.26	12.0	1.09
9.1	1.25	12.1	1.16
9.2	1.24	12.2	1.18
9.3	1.29	12.3	1.17
9.4	1.42	12.4	1.16
9.5	1.49	12.5	1.16
9.6	1.45		
9.7	1.28		
9.8	1.19		
9.9	1.16		

LWIR CVF SPECTROMETER (VEHICLE A18.006-4)

CALIBRATION DATA

LONG WAVELENGTH FILTER

λ (μm)	C_λ (MR/μm Volt)	λ (μm)	C_λ (MR/μm Volt)
12.6	0.214	19.0	0.381
12.8	0.221	19.2	0.380
13.0	0.230	19.4	0.377
13.2	0.241	19.6	0.374
13.4	0.256	19.8	0.369
13.6	0.267	20.0	0.364
13.8	0.271	20.2	0.358
14.0	0.267	20.4	0.350
14.2	0.259	20.6	0.356
14.4	0.262	20.8	0.366
14.6	0.275	21.0	0.376
14.8	0.286	21.2	0.384
15.0	0.291	21.4	0.390
15.2	0.289	21.6	0.396
15.4	0.290	21.8	0.405
15.6	0.290	22.0	0.418
15.8	0.290	22.2	0.425
16.0	0.292	22.4	0.438
16.2	0.295	22.6	0.459
16.4	0.300	22.8	0.477
16.6	0.304	23.0	0.506
16.8	0.311		
17.0	0.320		
17.2	0.335		
17.4	0.344		
17.6	0.355		
17.8	0.362		
18.0	0.369		
18.2	0.373		
18.4	0.376		
18.6	0.377		
18.8	0.378		

LWIR (CVF) SPECTROMETER (VEHICLE A18.006-4)

LIST OF CONSTANTS

M_s = -13.04

M_ℓ = -25.88

K_s = 19.88

K_ℓ = 25.69

P_o = 0.47

K_o = 0

Δt_p = 5 milliseconds

G = 1 for Channel 16

G = 10 for Channel 15

G = 100 for Channel 14

G = 1290 for Channel 13 for $V \leq 1.4$, where V = TM Voltage data corrected for in-flight calibrations

G = 1190 for Channel 13 for $V > 1.4$

X = 1 for Channels 16 and 15

X = 1 for Channel 14 when $V \leq 1$

X = 1.16 for Channel 14 when $V > 1$

X = 1.16 for Channel 13 when $V \leq 1.4$

X = 1.30 for Channel 13 when $V > 1.4$

C_p = 1 millisecond

$a = \infty \rightarrow N_1 = 0$

Z-THETA PROBE (VEHICLE IC503.22-1)

CALIBRATION DATA

MODE A

TELEMETRY VOLTAGE	IMPEDANCE (Z1 & Z10) (Ohms)
1.663	40
1.063	60
.800	80
.625	100
.525	120
.475	140
.425	160
.388	180
.363	200
.338	220
.300	240
.275	260
.250	280
.225	300

Z-THETA PROBE (VEHICLE IC503.-22-1)

CALIBRATION DATA

MODE B

TELEMETRY VOLTAGE	IMPEDANCE (Z1 & Z10) (Ohms)
1.786	35
1.594	40
.995	60
.727	80
.561	100
.490	120
.408	140
.357	160
.293	180
.255	200
.246	220
.242	240
.234	260
.220	280
.180	300

Z-THETA PROBE (VEHICLE IC503.22-1)

CALIBRATION DATA

MODE A

TELEMETRY VOLTAGE	PHASE ANGLE (ϕ) (Degrees)
.291	-90
.380	-80
.451	-70
.759	-60
1.000	-50
1.165	-40
1.392	-30
1.633	-20
1.899	-10
2.190	0
2.550	10
2.848	20
3.190	30
3.560	40
4.000	50
4.266	60
4.544	70
4.709	80
4.835	90

Z-THETA PROBE (VEHICLE IC503.22-1)

CALIBRATION DATA

MODE B

TELEMETRY VOLTAGE	PHASE ANGLE (ϕ) (Degrees)
.259	-90
.377	-80
.603	-70
.766	-60
1.000	-50
1.206	-40
1.457	-30
1.721	-20
2.000	-10
2.324	0
2.663	10
3.040	20
3.367	30
3.693	40
4.000	50
4.234	60
4.447	70
4.623	80
4.774	90

Z-THETA PROBE (VEHICLE IC503.22-1)

LIST OF CONSTANTS

MODE A

$f = 3$ MHz

$C_1 = 9.2 \times 10^{-6}$ microfarads

$C_2 = 11.8 \times 10^{-6}$ microfarads

$X_{FS} = 70.0$ ohms

$V = 0$

MODE B

$f = 7.2$ MHz

$C_1 = 9.2 \times 10^{-6}$ microfarads

$C_2 = 11.8 \times 10^{-6}$ microfarads

$X_{FS} = 52$ ohms

$V = 0$